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Contributions.

The Compound on the St. Paul.

Chicago, Milwaukee & St. Paul Railway, }
MILWAUKEE, July 1, 1895.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the report in your issue of June 28 of the discussion on Compound Locomotives at the Master Mechanics' Association I am seriously misquoted. I am reported to have said that we find from a record of two years' performance in the use of the compound locomotive that it cost, on an average, 2½ cents per 100 miles for repairs, against 4.7 cents for simple engines of the same class. This statement is nonsensical on the face of it, and I would not take up your space to contradict it if it were not the fact that we especially need accuracy of statement in giving experience with compound locomotives. The cause of the compound has been injured fully as much by injudicious friends as by "agnostics."

What I did state was to the following effect: The Baldwin compound, which we have had in service for about four years, was showing an economy of from 10 to 15 per cent. over the average of nine simple engines of the same class built at the same time, and was showing this economy in spite of the fact that during the past two years there had been spent an average of 2½ cents per 100 miles for repairs, as against 4.7 cents for the other engines; this smaller amount for repairs being due to the fact that the engine had not been in shop for general overhauling during this time, whereas the other engines had, and this shows that no extraordinary expenditures have been necessary upon the engine, to keep it in running condition.

I further stated that it was easy to make a 10 per cent. difference in fuel economy on any locomotive by allowing its physical condition to run down; all of which went to show that the economy of our compound would have been greater if it had been put through the shop before, and that we are justified in concluding that the machine was susceptible of showing a satisfactory economy over simple engines under unfavorable circumstances. We have not been able to find that the compound is going to cost us any more for repairs than the simple engines.

The above facts have an important bearing upon the availability of the type for general railroad service.

GEO. GIBBS,

Mechanical Engineer.

The Draught Appliances of the Lehigh Valley Ten-Wheeler.

PITTSBURGH, June 27, 1895.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Your statement in connection with the illustration of the Lehigh Valley 10-wheel engine, in your issue of June 14th, that you hope to show later a number of its interesting details, which I think many of your readers will join with me in hoping may soon be carried out, does not render inappropriate present reference to one which is shown without comment, and which happens to be incorrectly referred to in your list of dimensions. I refer to the position of the exhaust tip, which is given as 8 in. above center of boiler, while, as a matter of fact, or if correctly shown in the cut on page 380, it is 8 in. below the center. The engine, as a whole, shows correct and well studied design, on the lines of advanced practice; and this, to my mind, is particularly evident in its draught appliances, one of the most important details of a locomotive, and one which, in the majority of cases, seems to have received but little, if any, consideration on sound mechanical principles.

We have in this engine a low nozzle and lift pipe, a taper stack of small diameter at the throat or choke,

with a conical extension into the 'smokebox, a very simple and apparently efficient form of spark arresting netting, and a material reduction in the length of the smokebox extension, although I am unable to agree with you that it is entirely "within the recommendation in last year's report of the Committee on Exhaust Apparatus appointed by the Master Mechanics' Association two years ago." If the smoke box had been made in a single length, I think it could have been shortened about a foot, with advantage to the steaming of the engine, and without interfering with a cinder pocket. Passing this point, however, as to which my well settled convictions may make me somewhat over scrupulous, each of the features above stated is a good one, and, possibly excepting the spark arrester, which is not a common type, stands approved by recognized authorities and present successful practice. The combination of all these in one draught apparatus is a strong as well as a novel one, and ought to, and I believe does, produce the results you state, viz., good steaming with a large nozzle, and exemption from fire throwing.

The low nozzle and lift pipe, which the majority of master mechanics have, for some years past, been treating as "back numbers," have continued to do good work, while the supposed improvements which largely superseded them were wasting coal and piling up fire damages. The logic of facts, in this regard, furnishes a conclusive demonstration in the experience of Mr. McConnell, of the Union Pacific, the result of whose assignment of upwards of a thousand long exhaust pipes and extension fronts to the scrap pile, as stated on page 124 of the Master Mechanics' Report for 1894, having been such that argument in favor of the supposed "back numbers" appears needless. The low nozzle and lift pipe were, in that case, used with a diamond stack for bituminous coal, but the same arrangement, with a straight open stack, for anthracite, has given entirely satisfactory results on the wide firebox engines of the Philadelphia & Reading Railroad for the last 18 years. The spark arrester of the Lehigh Valley engine appears to be better adapted to this arrangement, when used with an open stack, than any other which has yet been produced.

The first of the conclusions of the report of the draught Appliances Committee before referred to was: "The results show that within the limits of these experiments the vacuum is greater when the nozzle is below the center of the boiler than when above it." The lowest point in these tests was 1½ inches below the center, and in the Union Pacific and Reading engines it is very much lower. By reference to the illustration of the revised Class P engine of the Pennsylvania Railroad in your issue of February 22, I find that the exhaust tip has been brought down to the center of the boiler, thus indicating that even that conservative and careful management is moving in the same direction.

The remarks of Mr. C. H. Quereau, Engineer of Tests, C. B. & Q. R. R., in the discussion of Mr. Squires' paper on "Locomotive Draught Appliances at the World's Fair," at the November, 1893, meeting of the Western Railway Club, are directly in point in this matter, although not reaching, it seems to me, the conclusion which his premises would justify, and particularly as they have the additional merit of brevity, I may be allowed to quote them. Mr. Quereau says (Report, pp. 89, 90):

"It seems to me that the action of the exhaust must be twofold. While in the smoke arch it must act in accordance with the principles of an injector, the column of exhaust steam imparting its motion and direction to the waste gases and forcing them from the smoke arch by direct contact and friction. If this assumption is correct, then the lower the exhaust tip, the longer the distance the exhaust must travel while in the arch and the stronger the draught it will produce. The lowest practical height for the nozzle will probably be the lowest point in the arch where the cinders will not be drawn into the exhaust nozzle when the engine is shut off. The netting can be adjusted to almost any height of nozzle. As soon as the exhaust strikes the stack it must act as a pump, the stack being the cylinder and the steam the piston. It therefore follows that to be most efficient the exhaust should fill the stack from the base to the top, the length of the stack corresponding to the stroke of a pump. For these reasons the center line of the exhaust tip should be the center line of the stack. In other words, a double exhaust nozzle would not be as efficient as a single. It is known that in that class of blowers which use steam directly for producing a draught, the most efficient form is that in which the steam issues in a number of comparatively small jets. The form in which the steam issues in the shape of a circular ring is not quite as efficient, but is more economical than when it escapes in a solid column as in the form almost uniformly used on locomotive exhausts. I am a little surprised that neither of the first two forms mentioned have not been more generally experimented with. I am of the opinion that the above are the correct theoretical principles on which to design the proportions and arrangement of the draught appliances in the front end, and that, if carried out in practice, would produce the most efficient draught with the least back pressure."

The small diameter taper stack, with inside conical extension, of the Lehigh Valley engine, appears to be substantially similar to that of the revised Class P Pennsylvania, and is another feature of the draught appliances which I think deserves note as good practice. Why the recognized advantage of this construction is not more generally utilized, is not easy to understand. It costs no more to make or to maintain than a straight stack, its appearance is more in keeping with the present ruling style of dome cover and sand box, and it is undeniably the more correct form under the well-settled principles of the flow of fluids. It may be, as has been stated on respectable authority, that "with a straight stack of proper diameter for engine, the height of exhaust pipe

need not be fixed as closely as when a taper stack is used," and that "the exhaust steam is more likely to fill a straight stack at some point, even though it is carelessly designed, than it is to fill a taper stack," but this can scarcely be accepted as an explanation, for there is neither necessity nor excuse for carelessly designed stacks, and the problem of fixing the proper height of an exhaust pipe ought not to be beyond the capabilities of a competent motive power superintendent.

The draught appliance committee's conclusion, based upon its tests, as to taper stacks, is that "the maximum draught can be obtained under all conditions by using a tapered stack having easy approach at the bottom and a tapered part at the top, having a total angle of about 10 degs.," and there do not appear to be either theoretical considerations or practical results which tend to show this conclusion to be an incorrect one.

The views of Mr. William Forsyth, of the C. B. & Q., on this subject, as stated in the discussion of Mr. Squires' paper before referred to, being not only better expressed, but also much better authority than my own, I will close an already over lengthy communication by presenting them. They are as follows:

"I contend that the choke stack, or taper stack, is the best shape. When engineers make a steam blast for a stationary boiler they shape the pipe like a trumpet at the bottom and flare it out at the upper part, and in that way they get an efficient blast, and that, I think, is the correct shape for a stack for a locomotive. It will replace the straight cylinder stack until the taper stack becomes the prevailing practice in this country, as it is in most foreign countries. The German and Swiss engineers have used it for a great many years and have worked out the proportion for it. This choke stack we have was really obtained from German engineers, and now we are trying to find out what is the best position for the minimum diameter and other proportions of the stack. The use of it on the C. B. & Q., has been very successful, and you will find in the table that the C. B. & Q. engine has a stack 13 in. in diameter, which is the smallest reported in any of the engines with an 18 x 24 cylinder. We have used that diameter on 19 x 24 engines, and have used it on the 20 x 24 consolidation engines, and where the engines are used for moderate speeds and the cut-off is not long, a 13 in. stack can be used on the latter engine, but where working on grades and a large volume of steam is thrown out it is found to choke up a little, and we then use stacks with a minimum diameter of 14 in.

The shape of the extension of the stack down into the smoke box, shown in Fig. 20A, is contrary to what I think are correct principles, in having the shape of the pipe for the inlet of the gas to be as small as 14 in., and then the stack 15½ in. up above. A better shape than that, I should say, is shown on the Webb engine 27B [substantially similar to the Lehigh Valley construction, J. S. B.], where they also have a short stack, and where it extends down into the smokebox with a large trumpet shape."

J. SNOWDEN BELL.

SOUTH BETHLEHEM, Pa., July 2, 1895.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have received from Mr. J. Snowden Bell a copy of his communication to you, in which he refers to the position of the exhaust tip which on page 381 of your issue of June 14 is stated to be 8 in. above center line of boiler. This is a mistake, and the correct arrangement of the draft appliances is given on page 380. That portion of the description of the engine on page 381 which refers to exhaust nozzle should be corrected as follows:

Exhaust nozzle, single or double.....	Double
" " variable or permanent.....	Permanent
" " diameter.....	3½ in.
" " distance below center of boiler.....	7 in.

Your description of the Lehigh Valley smokebox on page 381 reads as follows: "And the draft is so strong that a 3½ in. double nozzle can be run on an 18 in. x 24 in. locomotive." We have not as yet tried the arrangement on a locomotive with cylinders 18 in. x 24 in., but with cylinders 20 in. x 24 in., we use a double nozzle, the diameter of each nozzle being 3½ in.

S. HIGGINS, Superintendent Motive Power.

The Terminal Improvements at Providence.

[WITH AN INSET.]

The work of providing adequate railroad terminals for the city of Providence, R. I., has been under consideration since 1873, at which time a movement was organized to replace by a modern structure the existing station, built in 1846. The terminal problem in Providence presents difficulties not found in other cities. To overcome these has been the work of years, and it is still far from accomplished. In 1892 the plans had so far progressed that designs for the station were prepared which were shown in the *Railroad Gazette* for Sept. 22, 1893.

The site of the station which is now being constructed was, a few years ago, a circular salt water lake, called the Cove. It is shown in Fig. 1 by the dotted line. The first step in the improvement consisted in building walls to confine the Moshasuck and Woonasquatucket rivers, and the subsequent filling in of the Cove. This was done by the city. The Cove land, and that immediately surrounding it, was owned by various railroad companies and the city, and great difficulty was experienced in adjusting titles and boundary lines so that the actual work of construction might go ahead.

A portion of the improvement of great interest to engineers is the four large bridges which have been constructed, respectively, over Promenade street, the Woonasquatucket River, Francis street and Gaspee street. The latter bridge was finished several months ago, and the others are now approaching completion. Fig. 2 shows a panoramic view of the work at its present stage looking north from the old station. The Gaspee street bridge is at the extreme left. The large bridge in the center of the photograph is the Francis street bridge and in front of it is

seen the masonry work for the foundations of the station. To the right are seen the heavy pin bridge spanning the river, and the bridge over Promenade street adjoining it. The present line of the N. Y., N. H. & H. tracks is seen on the extreme right, and the new line will cross the various bridges at a higher level, as shown. In addition to these bridges, there is a large bridge, built by the city, over the river just above the new railroad bridge. This is 105 x 120 ft. The area of the Francis street bridge is about 66,000 sq. ft. That of the river bridge about 30,000 sq. ft. The Promenade street bridge covers about 19,000 sq. ft. Still another bridge will be built, that over the Moshassuck River, connecting Promenade street and Exchange place. Including this the total area of bridging will be over six acres. This gives a fair idea of the magnitude of the bridge work alone. There are about 12,000,000 lbs. of steel in the various parts of the work, and a single coat of paint for all the steel work covers 19 acres. The cost of the improvement, to the railroad and city combined will be upward of \$4,000,000.

The largest, though perhaps not the most important, part of the work, is the bridge over Francis street. This bridge will form, when completed, that portion of the station to be used for trains. Fig. 3, which is a plan of the station and tracks, shows the size and location of the bridge. It is 325 ft. x 205 ft., having an area of about 1½ acres. Francis street, spanned by the bridge, is 100 ft. wide. Over the street will be three spans—one of 43 ft. and two of 29 ft. 3 in. each. In addition to this there will be eight other spans of 29 ft. 3 in. each, the entire span of the bridge being about 325 ft. These spans are supported upon 156 steel columns 15 in. x 18 in., resting upon heavy masonry piers, upon pile and grillage foundations, the piers being below the level of the street. This type of foundation has been necessitated by the fact that the Cove is made ground. Under all the structures upon it there are all told, more than 17,000 piles. These are all of spruce, 45 ft. long, with 6-in. tips and 12-in. heads.

The flooring of this bridge, like that of the Gaspee and Promenade street bridges, is of steel troughs, as shown in Fig. 8. It was described in the *Railroad Gazette* of July 27, 1894, and will be referred to again later on. All of the Francis street bridge is completed, with the exception of a space 25 ft. wide, next the station, which has not as yet been erected. The street itself is divided into three spaces, the center span of 40 ft. being the driveway, while the side spans of nearly 30 ft. each are to be used for electric cars and for sidewalks. Two spaces left in the flooring of the Francis street bridge, afford light to the street below.

The metal work in this bridge, as well as in the other bridges, is of steel having 58,000 to 66,000 lbs. ultimate tensile strength. Calculations have provided for a uniform live load of 4,000 lbs. per lineal foot of each track, with an additional concentration of 40,000 lbs. at one point. A dead load is taken, for weight of ballast used, of 2,000 lbs. per lineal foot of track. This is in addition to the weight of the metal itself. There is an allowance for impact, consisting of an addition of from 120 per cent. at 10 ft. span, to 75 per cent. at 100 ft. span, to the live load effect. For the total load unit stresses of 18,000 lbs. and 14,000 lbs. are used, proper reduction for compression being made.

The station itself is shown in plan in Fig. 3. In front of the main doorway is a covered porte cochère upon a driveway bridge over Francis street. From the main waiting room two inclines lead up to the track level. If the plan of allowing passengers to cross the first track in order to take trains standing upon the second is not adopted, the two center tracks of the four main lines crossing the bridge are to be used for freight, and access to the further, or fourth track, will be had through the two inclined subways which are shown at the extreme right and left of the main waiting-room. These subways are 30 ft. x 7½ ft., and run the entire width of the station. Their further ends will be left open and an inclined approach from the street level will probably be built. The girders supporting these subways are riveted at either end to the webs of the columns. The entire station proper will be 500 ft. long, with a depth of about 100 ft. The main waiting-room as planned will accommodate 3,000 people and will have an area of 13,080 sq. ft., which should amply provide for the future growth of the city.

The two bridges on the right of Fig. 2, those over the river and Promenade street, are at this stage of the work, particularly interesting. The former is a fine example of heavy pin connected truss, and the latter, similar to the bridge at Gaspee street, is a model of strength and solidity. The foundations of the abutments for both bridges are upon piles, as shown in the cross-section Fig. 4. The river at this point is about 100 ft. wide. The foundations have batter piles on the river side to prevent the masonry from crowding forward. The abutment on the south side of the river is built upon a grillage of three courses of 8-in. hemlock, laid solid. This grillage is 18 ft. wide, the base of the abutment being 15 ft. The abutment on the north side rests upon a similar grillage 13 ft. wide. Adjoining this abutment is a line of piers, also upon piles for the columns of the Promenade street bridge. This street is 70 ft. wide. Upon its north side is built a similar line of piers, and an abutment or retaining wall, back of which earth filling will be made to the new grade of the tracks.

The bridge over the river is a pin-connected deck Warren truss. It is built on a skew and has a span of 104 ft. The trusses are spaced 10 ft., c. to c., and there are 27 of

them all told. There are 23 typical trusses, the other four being on the skew ends of the bridge. Except at the ends, the trusses are placed square to the abutments, as shown in Fig. 5. The elevation of the bridge, in Fig. 4, shows the method of hanging the floor beams. The trusses are braced together laterally in pairs, as shown in the plan of the bridge, Fig. 5. Between the trusses are placed the stringers, 5 ft. c. to c., on floor beams. These are shown clearly in the detail drawings of the bridge. It is intended to cover the bridge with a heavy wooden flooring, when finished, directly upon which the ballast will be placed. The tracks do not follow the line of the girders, but cross at any angle desired, as shown in Fig. 5. Provision for expansion in the intermediate floor beams is made, as shown at A and B, Fig. 7. Expansion of the bridge along the line of its girders is provided for by rollers at the south end. The rollers under the south end of the skew truss at the east end of the bridge roll in a direction at right angles to the line of the abutments, a necessary arrangement, since had the expansion taken place along the line of the skew truss a serious strain would have come upon the truss, which would have been pushed laterally by the expansion of the floor beams, their room for expansion having meanwhile been shortened by the expansion of the truss itself.

The stringers are braced by means of wing plates riveted to the floor beams, and from these angle braces are riveted across the top of the upper chords of each truss. As will be seen from the plan, Fig. 5, these wing plates and bracings occur only between pairs of trusses, so that lateral expansion may occur in the intermediate floor beams.

At D, Fig. 7, is shown one of the side floor beams, and the bracket from the post supporting it. The junction of the river bridge with the Promenade street bridge is shown at E, Fig. 7. It should be noticed that the lines of the trusses in the river bridge coincide with the lines of the box girders in the street bridge. The trusses for the river bridge were put together on a staging erected on piles in the river just at the east side of the bridge, and from here they were slid along in pairs on rails placed on the abutments until they had reached their proper places. This was done by hauling upon them by means of cables leading to the hoisting engine. This bridge is now completed and painted. It is provided to carry 12 lines of track. Fig. 6 gives a good view of it in general appearance, and also shows the Promenade street bridge, which adjoins it.

A peculiarity of the river bridge is the clause in the specifications calling for cotter pins to retain main pin nuts. Mr. Dawley, Division Engineer, says that he has used such cotter pins since 1887, and always specifies them. The question of their utility is a mooted point.

The bridge over Promenade street is composed of box girders supported on posts, extending along the curb line of the sidewalk, and at the abutments. The posts rest on granite piers, 8 ft. square at the bottom, and 3 ft. at the top. The design of the structure is similar to that of the Gaspee street bridge, which is now completed. The box girders in the Promenade street bridge are spaced 10 ft., c. to c., and between them, and resting upon shelf angles riveted to them, is the patent trough flooring, made under patents held by E. P. Dawley, Division Engineer, N. Y., N. H. & H., and Geo. B. Francis, Resident Engineer, N. Y., P. & B. & O. C. R. R. Terminal Co. (See *Railroad Gazette*, July 27, 1894.) The trough provides a means by which rain water is allowed to quickly drain through the structure, without standing for any length of time in the ballast, or dripping upon persons passing along the street below. These troughs are about 8 ft. long, and 10 in. deep, and are supported, as we have said, on a shelf riveted to the webs of the box girders. Fig. 8 shows a section of this flooring, riveted up, and about to be placed in position on the bridge. This engraving also shows the traveler used on the work.

The troughs are pierced with drain holes at either end, and discharge into copper gutters, which in turn deliver the water into spouts leading to the street. This flooring is first given a coat of red lead, after which it is covered with a waterproofing of Trinidad asphalt containing 20 per cent. of crude petroleum, to prevent it from becoming brittle. A channel shaped "hat" of wood is placed over the box girders to protect them from abrasion by ballast. The troughs of the flooring will be filled in with a mixture of gravel and asphalt, a material which will be porous, and thus allow rain water to penetrate it readily. Further, it will not shift and abrad the metal work, being practically a solid mass. It will extend a few inches above the top of the box girders, and then the broken stone ballast for the road-bed will be placed over the entire bridge. Mr. Francis says that they intend the bridge to be so solid when finished that one in a passing train will not be able to notice any difference between it and the solid ground, and the tracks, 12 in. all, will be laid on the bridge without reference to the line of the girders.

The columns under this bridge are built-up I-sections, with a latticed web, and solid web plates at top and bottom. The details of one of them is shown in Fig. 9. They are laterally braced by means of latticed struts, supported on latticed brackets. These brackets and struts are light and graceful in appearance, and relieve the otherwise heavy appearance of the bridge as seen from the street beneath. The columns are placed 10 ft. c. to c. along the inner side of the curb line. They are of such length as to give about 14 ft. clear headroom under the bridge.

At each end of the bridge one of the box girders does not extend across the entire span, on account of the skew. To support its outer end, and the cross girder put in to sustain it, heavy plate girders have been used, 8½ ft. deep and 79 ft. long. The end of the half box girder is clearly shown in Fig. 6 where the end plate girder has not yet been put in place. The latter were made somewhat deeper than would have been necessary otherwise, to act as a sort of fencing to the sides of the bridge. They are braced by wing plates riveted to their webs.

The box girders are each 52 ft. long, 3 ft. wide and 3½ ft. deep. They weigh 35,000 lbs. each. Shorter girders from the ends of the bridge extend beyond the two rows of columns. The interior of all box girders is accessible, for both machine riveting and painting, which is a desirable feature.

Among other improvements which have been made by the N. Y., N. H. & H. at Providence, the new freight yard, shown in Fig. 2 in the background, is worthy of mention. It lies between Promenade and Smith streets, and is 1,500 ft. long, and about 600 ft. wide at its greatest width. It has 23 tracks, with a total capacity of 600 cars, and an unloading capacity of about 400 cars. All work for the N. Y., N. H. & H. is under the direction of Mr. F. S. Curtis, Chief Engineer N. Y., N. H. & H. R. R. The N. Y. & N. E. also will build a new freight yard south of the new station, but this has not as yet been begun. A further improvement of the vicinity of the station will take place, when the new state house for which contracts have just been let, will be built. It will be located upon the hill in the right-hand background, Fig. 2, and will be a handsome structure. Francis street will then be carried up the hill, its line being somewhat changed so that it will pass the new state house.

Railroad Legislation in New Jersey.

The legislature of New Jersey has this year passed the following laws affecting railroads:

Chapter 80 amends a law of 1883 regulating the management of car trusts. It prescribes regulations under which rolling stock may be sold or leased. The condition that title shall not pass until full payment is made, shall not be valid, as to subsequent judgment creditors, except when suitable records have been filed with the Secretary of State, or, in the case of a road lying wholly in a single county, in the office of the Recorder of Deeds.

Chapter 119 extends the time in which new railroads may be completed. Companies whose rights expire Dec. 31, 1896, have them extended until March 11, 1897, provided they have actually spent money in surveys or for lands since Jan. 1, 1886. To get the benefit of this law company must agree to submit to the general laws affecting taxes, etc.

Chapter 241 is to regulate electric street railroad crossings. Whenever an electric line wishes to cross an existing railroad, outside the limits of cities, the Chancellor of the state, on application, must define the manner of crossing and order a separation of grades if he deems it practicable and necessary for the public safety. Crossings within the limits of cities continue to be made under existing laws.

Chapter 323 authorizes cities to assess and apportion the cost of paving streets where a railroad occupies the highway.

Chapter 385 authorizes towns and villages in first class counties to make ordinances for the safety of grade crossings. The officers of the town may order gates or flagmen, and may prescribe the hours of duty of attendants. A railroad may appeal from an order of the Town Board to the Circuit Court.

Railroad Legislation in Michigan.

The last Michigan Legislature passed laws affecting railroads as follows:

Public Act No. 23 amends section one of the Public Acts of 1893, and provides that it shall be lawful for any railroad company to sell or lease its road or any part thereof to any other railroad company, and to acquire by lease or purchase any other railroad. Said railroads must not have the same terminal points, and must not be competing lines. A majority of the stock must give consent, and the company purchasing or leasing must submit to the general railroad laws of Michigan.

Public Act No. 143 amends the act of 1893 relative to separate grades for railroads and public highways at crossings. Many changes are made. Section 9 now provides that if any railroad company and township, village or city cannot agree upon the grade, on petition to the State Railroad and Street Crossing Board by the railroad or the municipality the board shall investigate, may prescribe the profile, and apportion the expense, subject, however, to appeal to the courts.

Public Act No. 248 relates to the maintenance of gates at crossings of railroads and highways. Gates are to be erected whenever the State Railroad Commissioner deems it necessary. Failure to lower a gate at the proper time is punishable by fine and imprisonment.

Public Act No. 187 provides that the city counselor in the city of Detroit shall perform the duties required of the city attorney in determining railroad grades in that city, and in all actions arising from disputes in connection therewith.

Public Act No. 142 makes it the duty of railroad companies to provide a blackboard at every passenger depot on its line for the purpose of bulleting all passenger trains. Such bulleting must appear at least 20 minutes

before the actual schedule time for the arrival of such passenger train, giving the station at which the train then is, and, if late, how late, and such other information as would be of benefit to the traveling public. A penalty of \$25 and costs is attached for violation of the act.

Illinois Railroad Commissioners' Report.

The twenty-fourth annual report of the Railroad and Warehouse Commission of Illinois has just come from the printing office, although it is dated Dec. 1, 1894. The railroad statistics and information are for the year ending June 30, 1894. The Commissioners again complain of the failure of railroads to send in their reports in due season. The Commissioners complained to the Attorney-General, and according to the law he ought to have proceeded against the delinquent roads, but he has not done so.

About 20 complaints were heard by the Commissioners during the year. One of the principal ones was that of the citizens of Benton against the St. Louis, Alton & Terre Haute on account of insufficient train service. The commissioners ordered a passenger train to be put on so that residents of Eldorado and other places could go to St. Louis and return the same day; the road refused to comply with the order and the Circuit Court was asked for a mandamus compelling the road to put on the train, but the Court held that there was no authority either at common law or by statute requiring railroad companies to run separate trains for passengers and freight. (The existing service was a mixed train.) In view of this the Commissioners say: "The view taken by the trial court may be the correct one. If it is, then the people who have in a large number of counties in the state voted upon themselves heavy subsidies to railroad corporations, and whose children's children will

length of railroad in Illinois at the end of the fiscal year was 10,355 miles, which was 40 miles more than at the beginning of the year. Illinois has more railroad than any other state in the Union; 18.1 miles per 100 square miles of territory. The earnings and some other statistics are given for the whole of the roads reporting and also for the lines in Illinois; but in separating the Illinois statistics from the whole, estimates had to be used. The railroad tracks of the state are ballasted as follows: stone, 1,473 miles; gravel, 4,122 miles; cinders, 821 miles; slag, 93 miles. There are 4,099 bridges: 886 stone, 936 iron, 2,215 wooden and 62 combination. The total length of these bridges is 305,211 ft. The length of trestles is 635,261 ft. The number of highway grade crossings in the state is 10,688, and there are 320 crossings where the highway goes above or below the railroad.

Sixty-five passengers, 134 employees and 475 other persons were killed, and 258 passengers, 1,057 employees and 512 other persons were injured in Illinois during the year. The number of passengers killed is nearly twice as large as during the preceding year, but the other items show a large falling off.

The amount of taxes paid by the railroads in Illinois during the year was \$3,846,379, which is \$209,993 more than in 1893.

Brakes on Light Railroads.

Question No. 20 of the International Railroad Congress is on brakes for light railroads, the reporter being M. Ploq, Superintending Engineer of the General Company of Economic Railroads of France. The report covers 33 pages of pretty small type, but is of little value to railroad men in this country, and we should suppose of but moderate value anywhere. It is merely a statement of the kind of brakes used on various light railroads. Mr. Ploq received replies from 46 companies out of 120 to which he sent his detailed list of questions, and of these 46 eleven

On the few light railroads of England and Wales mentioned the automatic vacuum and the Westinghouse are both used. Shoes are cast iron or wood. In Holland the Smith-Hardy non-automatic vacuum is used and cast-iron brakeshoes.

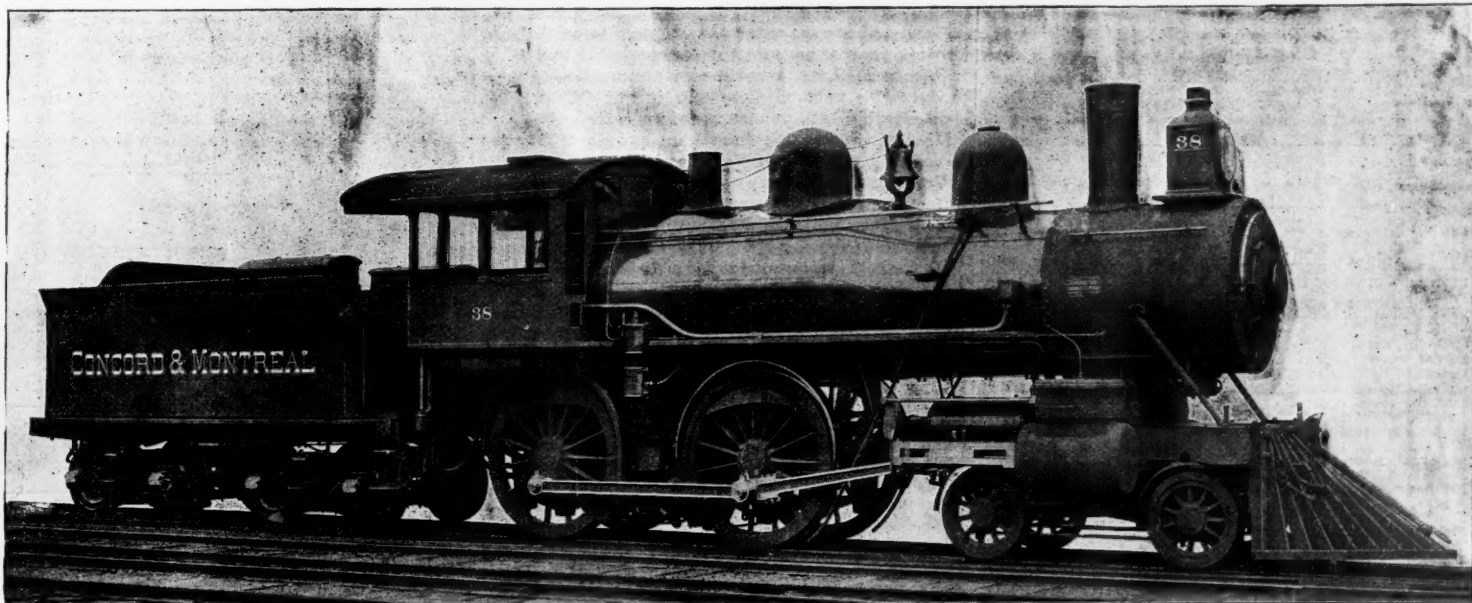
In Italy, as a rule, continuous brakes are not used on the light railroads, but screwbrakes are provided for the locomotives. One company uses an automatic vacuum and one a compressed air-brake. The Norwegian State Railroads use automatic vacuum brakes for broad gage and Carpenter compressed air for the narrow gage lines. Engines and tenders have screw or steam brakes when not supplied with continuous brakes. The brakeshoes are mild cast iron. In Switzerland the Hardy automatic vacuum is used.

Mr. Ploq gives the following summary of the regulation of the matter of brakes by the Federal Council of the German Empire.

The percentage of axles which must be braked is:

Grade.	Speed.			
	9½ miles.	12½ miles.	19 miles.	25 miles.
0 per cent.	6	6	6	10
5 "	6	7	12	18
10 "	10	13	18	25
15 "	15	18	24	32
20 "	20	23	31	39
25 "	25	29	37	47
30 "	30	34	43	54
35 "	34	39	49	62
40 "	39	45	56	70

The order further requires that the speed should not exceed 25 miles an hour. Speeds of between 19 and 25 miles can only be authorized by the management on broad gage lines constructed on their own road bed, and in the case of passenger trains with not more than 26 axles and provided with the continuous brakes. How-



Concord & Montreal 8-Wheel Passenger Locomotive.

not live long enough to see the debt thus incurred paid, have no alternative but to accept such accommodations as railroad managers may see proper to give them, be it vestibule, way freight or hog train; and if they are so miserably unfortunate as to live on a branch line the chances are 90 to 1 that if they travel by rail at all they will have to take the hog train. This may be the law as it exists to-day, but it is not justice, and we do not believe the court of last resort will so hold."

The Commissioners inspected a number of roads in August, September and October, being accompanied by Mr. Morgan, their consulting engineer. Generally speaking, the railroads furnish special inspection trains cheerfully, but on one road the Superintendent, although he furnished the train, said he thought the Commissioners had no right to ask such a favor.

The grain inspection department of the Board is reported as successful and satisfactory to the dealers. The business has fallen off greatly during the year, however, and it became necessary to discharge men and cut down salaries so as to reduce the expenses about \$30,000.

The Commissioners repeat a recommendation made in 1893 that the law empowering the Commission to compel repairs to defective roadway and bridges ought to be made stronger. It is also recommended that the law requiring suitable station buildings at all villages of over 500 population be changed so as to apply to all containing over 200. The report of the consulting engineers gives a list of all crossings in the state equipped with interlocked signals, and an abbreviated copy of this list is printed on the margin of the revised map of Illinois which the Commissioners recently issued. The consulting engineers' report contains about 50 pages of notes of the physical condition of roads inspected during the year. There are 103 interlocking plants in the state, nine more than in the previous year.

The statistical portion of the commissioners' report is made up, to a considerable extent, after the style of the reports of the Interstate Commerce Commission. The

replied that they worked no secondary lines of railroad. The brakes in use are screw brakes, lever hand brakes for freight cars, steam brakes on locomotives, compressed air and vacuum brakes, one buffer brake and the Heberlin friction brake. The buffer brake is used in Italy by the Piedmontese Steam Tramway Co. The Heberlin brake is automatic, continuous and worked by hand. A roller carrying a drum fitted with a chain can be brought into contact with another roller placed on the axles, setting the brake by the friction of the rollers. The movable roller is held free by levers held up by a cord on a windlass. If the cord is loosened the friction contact takes place. This brake is an improvement of an old system, and is in use on the small lines of the Belgian Northern.

We find in Austria the Hardy vacuum brake, non-automatic, used on the trains of two light railroads and a screw brake used on the locomotives. In case of the engine 40 per cent. of the weight is braked and 75 per cent. of passenger cars with a half load of passengers. The brakeshoes are cast iron with 15 to 20 per cent. of steel. One system working several narrow-gage lines brakes 45 per cent. of the engine weight and 100 per cent. of the empty car weight. The Hardy brake can be graduated.

In Belgium the Heberlin brake is used on the cars of several light lines, and the engines have screw brakes. The brakeshoes are cast iron. On the lines of the National Light Railroad Co., which are operated in a number of separate systems, various brakes are used—the screw, the vacuum, the automatic vacuum, the Westinghouse and the Heberlin. Here the brakeshoes are of gray iron. In France some of the light railroads use no continuous brakes; others use the Smith-Hardy vacuum, non-automatic, the compressed air brake being thought preferable but more costly. Screw brakes are also used for the locomotives. Cast-iron brakeshoes are used. In India the automatic vacuum seems to be the coming system as well as on the Nepal railways and those of the Cape.

ever, at the end of these trains may be added as a maximum of 12 axles not fitted with continuous brakes, on condition that if the grade be greater than 5 per cent. the last car have a brake with a brakeman.

Trains running at a speed greater than 19 miles an hour must be made up of rolling stock in conformity with the conditions required on main lines. The regulations provide that on grades in excess of 40 per cent. and on railroads worked by special methods, cog wheels, or the force of gravity, etc., the governing power of the different Federated States shall make suitable arrangements.

Concord & Montreal 8-Wheel Passenger Locomotive.

The accompanying engravings show side and rear views of a heavy passenger locomotive recently designed and constructed by the Schenectady Locomotive Works for the Concord & Montreal Railroad.

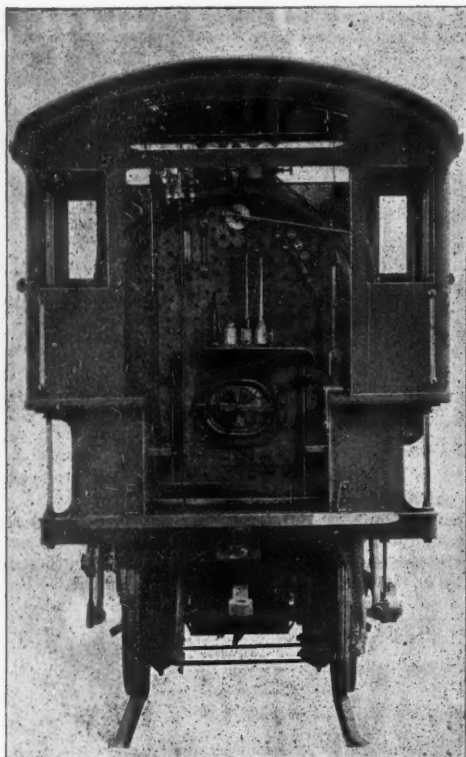
In designing the locomotive the builders were restricted to a weight on driving wheels not exceeding 76,000 lbs. In order to reduce to a minimum the effect of reciprocating parts on the track through the counterbalance of driving wheels, the piston, crosshead, connecting rods, crank-pins and wheel centers were reduced to the minimum weight, so that the effect on the rail at a speed of 60 miles per hour is only equivalent to the ordinary construction of the American type of engine with cast-iron driving centers and weighing 9,000 lbs. less on drivers.

The driving wheel centers are of cast steel and of very light weight, the crank pins are hollow, while the connecting rods, crosshead and piston are greatly reduced in section from ordinary practice.

Particular attention was paid to making the locomotive convenient for engineer and fireman; the arrangement in cab of reverse lever, throttle lever and all operating valves is such that they are conveniently located as in the ordinary American type of locomotive having the deep firebox boiler.

As will be seen from the rear view and the specifications, the boiler is of the extended wagon-top radial stay type with wide firebox, extending out over frames and over back driving axle and sloping down towards front end, giving a depth of 25 in. below shell of boiler, thereby allowing ample space for fire between grates and firebrick.

The general design of the engine is similar to that of



Rear View Concord & Montreal 8-Wheel Passenger Locomotive.

the 16 engines recently built by the Schenectady Locomotive Works for the Boston & Albany Railroad.

The following are the principal dimensions and weight of the engine:

Cylinder, diameter.....	19 in.
Piston, stroke.....	24 "
Driving wheels, diameter outside of tire.....	70 "
Driving wheels, diameter of centers.....	63 "
Driving-wheel centers of cast steel, tires held by retaining rings.....	90 "
Boiler, extended wagon-top radial stayed.	
Working pressure.....	190 lbs.
Boiler, diameter at front end.....	60 in.
Boiler, diameter at back end (back head a true circle).....	70 "
Firebox (inside length).....	90 "
Width, inside.....	10 1/4 "
Firebox depth at back end.....	61 3/4 "
Firebox, depth at front end.....	73 3/4 "
Tubes, number of.....	299
Tubes, diameter.....	2 in.
Tubes, length.....	11 ft. 6 in.
Tubes, space between.....	3 1/2 in.
Weight of engine in working order.....	116,400 lbs.
Weight on drivers.....	75,000 lbs.
Total wheel base of engine.....	25 ft. 9 in.
Driving wheel base of engine.....	8 ft. 6 in.
Driving axle journals.....	8 x 11
Engine truck journals.....	6 x 10
Tender truck journals.....	4 1/2 x 8
Diameter of engine truck wheels.....	33 in.
Diameter of tender truck wheels.....	36 in.
Tank capacity.....	4,000 gals.
Tender frame is made of 6 1/2 x 4 x 3/4 angle iron.	
The tender trucks are the Schenectady Locomotive Works standard iron truck with channel iron floating bolsters and inside brakes.	
Engine and tender truck wheels are the Snow bootless steel tired wheel.	
Locomotive is fitted with the Westinghouse air brake on driving wheels, tender and train; Westinghouse air signal Richardson balance valves, Leach sand feeding device, Nathan & Co sight feed cylinder oiler, Hancock inspirators and 8 inch triple expansion exhaust nozzles.	

Previous to the delivery of the locomotive it was run a few trips on the New York Central on heavy fast passenger trains and the accompanying indicator cards obtained.

Mr. Aspinall on Express Locomotives.

Question No. VI. of the International Railroad Congress is on Express Locomotives,—the type most suitable for high speeds, the uses of high pressure and the compound principle; improvements in distribution and balanced slide valves; engine building as related to the strains on permanent way, and the effect on this latter point of the compound principle. The reporter chosen to deal with this question was Mr. John A. F. Aspinall, Chief Mechanical Engineer of the Lancashire & Yorkshire Railway. Mr. Aspinall took up the matter with zeal, and the result is the remarkably fine report which is now presented.

The report proper contains about 27,000 words, and would fill nine pages of the *Railroad Gazette*. Moreover, a careful alphabetical index has been prepared of the text of the report. All of this, however, is only the beginning. Appended is a list of dimensions of express passenger engines, giving particulars of all the principal dimensions of cylinders, boilers, fireboxes, frames, wheels and axles, with weights. These descriptions include nearly 100 items for each engine, and dimensions are given

in both English and French units. The table includes 45 individual examples of express passenger engines with four wheels coupled, five with six wheels coupled, four single driver engines and 14 compound engines, or in all 68 locomotives. This table fills 32 pages in small type. It does not contain many American examples, but is perhaps all the more interesting and valuable to American engineers for that reason; that is, it puts them in possession of an amount of information concerning foreign locomotives that has never been collected before, so far as we know. Following this table are diagrams, with principal dimensions of some 70 locomotives as described in the table. Many pages are given to diagrams showing standard trains and train weights, profiles of grades, and speed diagrams of these trains over these profiles as hauled by the engines mentioned in the preceding tables. There are at least 70 of these diagrams, so that, as the reader will easily see, one may gain an immense amount of information. This, however, is not all that the report gives.

One of the most interesting tables shows certain important facts with regard to each one of the engines, of which particulars are given in the large tables mentioned above. This special table gives the ratio of heating surface, the cylinder area and cylinder capacity, the weight per horse power, etc. The column headings are: Area of two cylinders in square inches; capacity in cubic inches; ratio of total heating surface to cylinder area,—namely, square ft. to square in.; ratio of heating surface to cylinder capacity,—namely, square ft. to cubic in.; ratio of firebox heating surface to tube heating surface; ratio grate area to total heating surface; tractive force to weight on driving wheels; horse power at 15 miles an hour; weight per horse power of engine and tender; weight per horse power of engine only. It will be seen that this table gives a great amount of very interesting information, dealing as it does with 67 different locomotives.

Finally, there are general drawings of some 60 of the locomotives that have been described in the tables. It will be seen that it would be quite impracticable to reproduce this valuable document in any fulness. We shall give, however, an abstract of the text.

Mr. Aspinall states that the time was quite too limited to follow out the programme assigned to him in its entirety, and that the report will consist almost entirely of facts concerning the engines from which information has been received. He considers that he gives at once in practical form the opinions of the leading engineers as to the best practice and type by simply presenting the particulars which he has tabulated. He points out that in general terms the most suitable type depends entirely on the nature of the road. If the road is easy and the trains light, single driver engines are most successful, because the adhesive power is not so important a factor and the absence of coupling rods enables the engine to run with greater freedom. On the other hand, with a heavy road, plenty of adhesion and tractive force must be had; hence more drivers. The most important part of a high speed locomotive is its boiler capacity, for as the speed increases so will the demand for steam.

Most Suitable Type for High Speeds.—The engine most in favor in Great Britain and the United States has four drivers coupled with a leading bogie truck. The use of the bogie enables the engine to pass around curves easily, also puts considerable weight forward of the driving wheels, which tends to solidify the road and bring it into the best position to support the heavier weight following on the drivers.

The maximum capacity of the locomotive boiler is nearly reached. In America and on the Continent larger boilers can be used than in England, because of the greater clearance given by permanent structures. This point is well illustrated in the report by comparative diagrams showing the outline of the English minimum structure and outlines of locomotives and cars in England, the United States and on the Continent. American and continental rolling stock could not get through the English tunnels and under their bridges. The rigid wheel base practically determines the size of the firebox, which must be placed between the axles and between the main frames. In America fireboxes are made much larger by putting them above the frames and pitching the boilers very high; but the English bridges forbid this. The American method has the additional advantage of enabling the wheel base to be shortened.

Mr. Aspinall takes up briefly the question of the future increase of speed, quoting the *Scribner* articles by Messrs. Forney, Ely and Webb, also Mr. Barnes in the *Engineering Magazine* for June, 1894, and Mr. Du Bosquet, President of the French Society of Civil Engineers. Mr. Forney pointed out that fast running is largely a question of steam, and that the limits of the weight and dimensions of locomotives are difficult to get over, and the generally accepted rules of train resistance put almost insuperable difficulties in the way of any great increase of speed. Mr. Ely pointed out that while the measure of speed and capacity rests in the firebox, one great practical difficulty in the way of very high speeds is that of properly signaling the road. Mr. Barnes also shows the necessity for greater boiler capacity, and says that high average speed on heavy grades is impossible within the limits of steam locomotive construction. A grade of one per cent. demands about 1,500 additional H. P. at 100 miles an hour and 900 at 60 miles an hour. Mr. Du Bosquet says that a drawbar pull which would give a speed of 75 miles an hour on a down grade of 1 in 200 would only give 57 1/2 miles an hour on

the level and 31 1/4 on an up grade of 1 in 200. To increase the average speed by a small amount the power of the engine must be greater in proportion. Thus, if 322 H. P. is sufficient to haul a train at 50 miles an hour up an incline of 1 in 200, it will require 2,960 H. P. to draw the same train up the same grade at 125 miles an hour. Finally, there is a limit of speed beyond which the engine cannot draw itself, let alone a train. The French express locomotives now weigh about 158 lbs. per horse power indicated when exerting their maximum effort. Mr. Du Bosquet, applying these figures, finds that to draw a train of 100 tons at a speed of 75 miles an hour up an incline of 1 in 200 an engine must weigh 130 tons and generate 1,810 H. P. If the speed is increased to 87 miles an hour on a similar incline the engine would have to weigh 468 tons and generate 6,532 H. P.

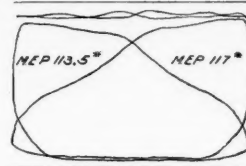
These considerations remind Mr. Aspinall that Mr. Barnes showed the engine and train resistance to be much lower than generally supposed. The formula of D. K. Clark and the experiments quoted by Mr. Du Bosquet are briefly considered, and the experience of the Empire State express is taken to show that Clark's and Du Bosquet's figures are too high, and at the same time Mr. Aspinall is of the opinion that those of Mr. Barnes are too low.

The difficulty of making up time when a train is scheduled to run at high speeds is very great indeed. For instance, if a train running at 60 miles an hour has lost a minute it must run 15 miles at 70 miles an hour to make up that minute, showing what a great length of line must be run over to make up even so small an amount of time as one minute.

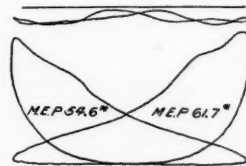
High Pressure and the Compound Principle.—The compound principle has passed the experimental stage; therefore, the author will not lay before the members of the Congress its primary objects.

He says the cylinder proportions should be so arranged

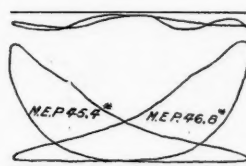
Spring, 100 lbs.
Rev. per minute, 120.
Miles per hour, 25.
Gage pressure, 195 lbs.
Throttle wide open.
Cut-off, 12 in.
Vacuum, 4 in.
Total H. P., 934.



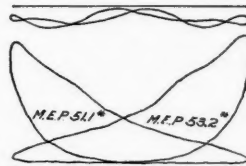
Rev. per minute, 200.
Miles per hour, 41.5.
Gage pressure, 190 lbs.
Throttle wide open.
Cut-off, 6 1/2 in.
Vacuum, 3 1/4 in.
Total H. P., 785.



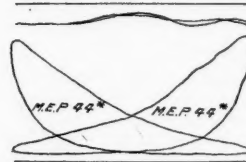
Rev. per minute, 260.
Miles per hour, 54.
Gage pressure, 182 lbs.
Throttle wide open.
Cut-off, 6 1/2 in.
Vacuum, 4 1/4 in.
Total H. P., 869.



Rev. per minute, 276.
Miles per hour, 57.
Gage pressure, 186 lbs.
Throttle wide open.
Cut-off, 6 1/2 in.
Vacuum, 4 in.
Total H. P., 972.



Rev. per minute, 288.
Miles per hour, 60.
Gage pressure, 185 lbs.
Throttle half open.
Cut-off, 6 1/2 in.
Total H. P., 856.



Cards from Concord & Montreal Locomotive on New York Central, June 8 and 11, 1895.

that the combined effort is as continuous as possible; otherwise, the engine would not be balanced in a very important particular and heavy shop repairs would be the result. Accumulated experience indicates that the volume of the low pressure cylinder should be at least double that of the high pressure cylinder. He then considers briefly the questions of the starting valve and intercepting valve.

One of the most complete sets of figures as to English experience which Mr. Aspinall has seen is from Mr. Wilson Worsdell concerning the compounds designed by Mr. T. W. Worsdell. As the reader doubtless knows, Mr. Wilson Worsdell is Locomotive Superintendent of the North Eastern, having succeeded his brother in that position. The documents submitted embody about 17

different statements, showing the working of the compounds in relation to engines of ordinary type. The consumption of coal as given in these statements deals with periods extending over two and a half or three years, thus making the figures of much greater value than of trials of a few weeks only. Four hundred and forty seven non-compound engines running almost 15,000,000 miles consumed an average of 36.52 lbs. of coal per mile; 395 compounds running nearly 14,000,000 miles consumed an average of 33.45 lbs. per mile, the saving having been 8.40 per cent. The maintenance of the compounds cost less than that of the ordinary engines but the consumption of oil was more. Mr. Aspinall thinks that neither of these items is in any way connected with the compound principle. He gives a summary table of the experience with these engines, showing that the coal saving per mile in the compounds fluctuates very much with engines of various design and in different classes of work, making it probable that the engines, either compound or simple, were not always perfectly adapted to the work to which they were applied. In fact the saving of coal, in percentages, varies from 0 up to as much as 23.8 per cent. The savings in express passenger service run from 4.4 up to 6.5, being in all cases less than the average of 8.4. The greatest percentages are in "goods and mineral" service and presumably in slow and heavy traffic.

This is on one railroad system, it will be remembered, namely, the North Eastern with the Worsdell compound, and the average coal consumption for the compounds was 33.45 lbs. per mile in all services. Minute particulars are given of a week's running between London and Carlisle of the 7-ft. Webb compound "Greater Britain". 3,588 miles were made. The average speed in motion was 47.66 miles an hour; that is, after deducting the stops. The average weight of train, loaded, including engine and tender was 237½ tons (long). The consumption of coal per mile run was 33.07 lbs., including 1.2 lbs. for lighting up. On the Belfast & Northern Counties Railway several Worsdell compounds have been used some time with favorable results. The saving in passenger service was from 11.17 to 17.74 per cent.

Brief reference is made to American and French practice, from which we find that the highest boiler pressure recorded is that shown on the Paris, Lyons & Mediterranean, namely, 212.9 lbs. per square inch. The north-

Improvements in Distribution and Balanced Slide Valves.—Balanced slide valves have not been greatly used in England. Experiments have indicated that the difficulties of repair are sufficient to retard their introduction. Some time ago Mr. Aspinall published a paper in the *Transactions of the Institution of Civil Engineers* giving results of experiments with a valve dynamometer which, in his opinion at the time, tended to show that the gain to be anticipated by the use of a balanced valve was so slight that it would not be worth while to depart from the common D-valve. The experiments were made with valves resting against a vertical face. Since writing that paper the author has had reason to think that the same view cannot be held with regard to the valves resting on a horizontal face where the wear and tear is greater, possibly on account of the fact that the lubricant is more rapidly swept away by any water that may get into the cylinders. He then mentions the piston valve used on the North Eastern by Mr. Worsdell which is said to save 50 per cent. of the wear and tear of slide valves in motion.

On the Lancashire & Yorkshire Mr. Aspinall has tried a partially balanced valve placed above the cylinders which has shown great advantage in wear and some economy in fuel.

Strains on Permanent Way.—The topic of the relation between engine building and strains on permanent way is very briefly considered. The experiments of Professor Goss at Purdue are briefly described. The whole emphasizes the well-known fact that all reciprocating parts should be as light as possible. The author shows that a high center of gravity promotes ease in running, and consequently is less destructive to the road; this because the weight of the engine is thrown more vertically on the center of the outer rail, preventing the wheels from mounting when rounding curves at speed. A simple diagram illustrates this, but it is so simple that the reader can easily construct it for himself. The oscillations of an engine with a high center of gravity will be longer than those of a low engine and it will ride easier, owing to the elasticity of the springs being brought more into play. The conduces, also to the reduction of side shocks and the strains in wheels and axles are minimized. "All things considered point to the advantage of high centers of gravity and the use of wheels with large diameters for the continuous high speeds which are now made possible by the improved roads and signaling. The piston speed becomes less, and therefore the retarding effects of the reciprocating parts are reduced." The author presents a statement (not printed in the report before us) supplied by Mr. Barnes relative to the effect of the distributing influences of compound engines on the permanent way and can only endorse those views with relation to Great Britain.

The report then proceeds to descriptions of individual engines. These descriptions are brief paragraphs expanding somewhat the facts given in the tables and diagrams mentioned at the commencement of this abstract.

On the whole, the report is a singularly fine piece of work, and we congratulate Mr. Aspinall upon it, and only regret to learn that ill health kept him from making it even more complete.

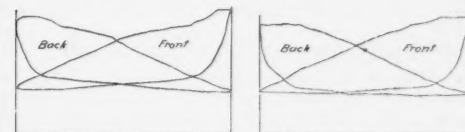
Effect on Indicator Cards of Through Piston Rods with a Surrounding Steam Space.

The four indicator cards, shown herewith, were taken from a two-cylinder cross-over Richmond compound locomotive. This engine had been running in slow freight service for about ten days, and was afterward put in fast freight service. The cards taken in fast freight service indicated that the steam admission was late at the front end of the low-pressure cylinder, and as the cards taken in slow freight service did not have this defect, the valves were gone over by an expert, and it was found that the lead was late at the back end of the low-pressure cylinder, consequently the eccentric rods were shortened ¼-in., just the contrary to what the cards showed. The eccentric rods on the high pressure side were lengthened ½-in., and it will be noticed that this was a little too much, as the back-end of the high-pressure cylinder is deficient in lead, and that the front end has excessive lead, also that the compression is higher at the front end, due to excessive lead. The next move was to find out what caused this at the front end of the low-pressure cylinder. It was suggested that probably the through piston rod had something to do with this peculiarity of the indicator cards taken from the front end of the low-pressure cylinder. It was then suggested that cards be taken with the cylinder cocks closed and with them open, in order to discover the difference, if any, in the cards taken in this way. On June 6 this engine hauled ten standard P. R. R. passenger coaches 32 miles making seven stops, in four hours and ten minutes. Cards were taken from the engine. A number of cards were taken with the cylinder cocks closed and with them open, and the two cards taken from the low-pressure cylinder with the accompanying cards from the high-pressure cylinder are representative ones of the number taken in this manner. From card 312, taken with the cylinder cocks closed, it is evident that there was an accumulation of condensation in the steam space surrounding the through piston rod, which found its way back into the cylinder—there being no way of draining it off.

The temperature of this condensation being less than the temperature of the entering steam at the beginning of the stroke, absorbed heat therefrom, reducing the temperature of the steam until there was an equaliza-

tion of temperature, and consequently pressure, causing a loss of work. This reduction in the size of the card taken from the front end of the low-pressure cylinder was more serious when the engine was in the shorter cut-offs, when the volume of steam admitted at each stroke was less. After cut-off took place re-evaporation of a part of this water began and continued up to the point of release, where there was a sudden reduction of pressure and an augmented re-evaporation of the water still

Cards from Richmond Compound Locomotive.



No. 320.
M. E. P., Front, 56.6.
M. E. P., Back, 52.7.
I. H. P., Front, 274.2.
I. H. P., Back, 246.7.
Revolutions, 282.
Miles per hour, 51.61.
Boiler pressure, 188.
R. L. 12, T. L. 3.

No. 312.
M. E. P., Front, 61.3.
M. E. P., Back, 55.5.
I. H. P., Front, 271.6.
I. H. P., Back, 237.7.
Revolutions, 256.
Miles per hour, 47.2.
Boiler pressure, 192.
R. L. 15, T. L. 8.



Cylinder cocks open.
M. E. P., Front, 20.5.
M. E. P., Back, 21.0.
I. H. P., Front, 247.7.
I. H. P., Back, 230.5.
Total I. H. P., 1,019.1.

Cylinder cocks closed.
M. E. P., Front, 15.4.
M. E. P., Back, 13.3.
I. H. P., Front, 170.2.
I. H. P., Back, 139.7.
Total I. H. P., 879.2.

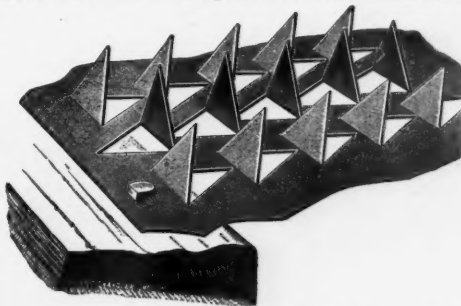
Richmond compound locomotive, drivers, 61.5 in.; cylinders, H. P., 19 in., L. P., 30 in.; stroke, 24 in. Train, 10 cars, 132 miles in 4 hours 19 min. Valves, inside clearance L. P. valve, ¼ in.; do. H. P. valve, ¼ in. Outside lap, L. P. valve, ½ in.; do. H. P. valve, 1 in. Leads, both valves, ¼ in. The scale, in the original drawings, for the H. P. cards was 120, and for the L. P. cards, 60.

present, continuing during the return stroke, and the piston head and cylinder would be heated up by the entering steam on the opposite side of piston head, causing a high back pressure line. It will be noticed that the terminal pressure of card taken from the front end of the low-pressure cylinder (No. 312) is higher than the terminal pressure of card taken from the back end. Number 320 was taken with the cylinder cocks open, and it will be noticed that the mean effective pressure and the indicated horse powers of the two ends of the cylinder are very nearly the same.

This engine came to Altoona with ½-in. inside clearance on each side of the exhaust of the low-pressure valve, and it was found by experiment that this could be increased to ¾-in. (which was done), without any apparent loss of steam, and a remarkable reduction in back pressure. The engine has since been sent to Chicago.

The Sheffield Steel Cattle Guard.

The illustration shows a method of constructing a metal surface cattle guard recently brought out by the Sheffield Car Company, of Three Rivers, Mich. It consists of four sheets of steel boiler plate, two of which go between the rails and the other two outside, on either side, the four sheets, being of the same dimensions, are interchangeable. These sheets have teeth, as shown in the engraving, which are struck up very close together all over the surface. The points are a little less than 3

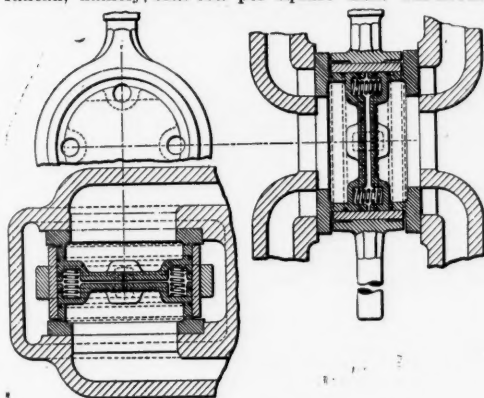


in. apart in each direction and are 3 in. high, making a very formidable floor for an animal to cross. The makers claim, however, that a man can walk over the guard blindfolded without possible injury.

It will be observed that it has the merit of simplicity. There are no bars or rods to be broken or displaced and no preparation of the track is needed. Moreover, it is said not to be noisy under passing trains. As furnished, it is usually coated with asphaltum, but galvanized sheets will be supplied at an additional charge. The sheets are sold at \$15 a set coated with asphaltum, or \$20 galvanized. The makers inform us that this new guard is being received with a good deal of favor and that they are now behind their orders for it.

Points to be Specially Protected on Lines of Fast Traffic.

One of the questions to be considered at the forthcoming session in London of the International Railroad Congress is the means to be used to avoid reduction of the speed of fast trains, and to do away with shocks, at the passage of special points, such as sharp curves, long slopes, facing point switches, track crossings, etc. The



Aspinall's Partially Balanced Slide Valve.

ern and the southern railroads of France have pressures of 198.6 lbs. Mr. Aspinall then refers briefly to the use of increased pressure in compound locomotives. It has been found by experience that the high pressure cylinders should be made at least one inch larger in diameter than ordinary cylinders of a simple engine having the same power. The boiler pressure must be increased from 20 to 30 lbs. per square inch, and Mr. Worsdell in his latest compound has increased the pressure 40 lbs. as compared with simple engines in the same service. In that case the total pressure is raised to 200 lbs. The adoption of high pressures necessitates proportionately stronger steam joints and lubricants having a high flash point, also gland packing which will withstand the extra temperature. The latter point, however, has become of minor importance, because of the introduction of the excellent metallic packings, which enable engines to run for 12 months without re-packing.

Having ascertained the large and varying amount of fuel economy realized the question now arises: Will it cover a reasonable interest on extra first cost and on repairs? With regard to this Mr. Aspinall does not commit himself.

reporter on this question is Mr. Sabouret, of the Ponts et Chaussées, Principal Engineer of Road on the Paris & Orleans Railroad. Mr. Sabouret's report is printed in the March number of the *Bulletin* of the Congress, which *Bulletin*, by the way, has for the last two or three months been publishing the reports on the various questions.

In addressing his inquiries to various railroad companies before beginning the preparation of his report, Mr. Sabouret assumed that he was called upon to report with regard to the great lines which are traversed every day by several trains having a speed of at least 70 kilometers (say, 43½ miles). The replies received show that in assuming this speed too high a limit was not chosen, and it appears that on lines where such speeds are made, no particular arrangement is adopted to prevent slackening at special points, except, perhaps, at drawbridges and at stations on single track; and in general it may be said that the question when it comes to actual practice is rather commercial than technical; it is more a question of what the public demands in the way of speed accommodation than of what the railroad companies require as a matter of safety, and consequently the replies to the circular letters do not bring up any very instructive points.

Junction points are within the provinces of another reporter, and therefore Mr. Sabouret considers his subject under the special points of grade and line, of track apparatus and conditions, and of train movement.

On the lines from Paris to Lyons and from Paris to Bordeaux, the ruling grades are ½ of 1 per cent., but grades of 0.8 of 1 per cent. are exceptionally found. On some great lines the ruling minimum curve has 875 yds. radius, but on those lines there are curves of 547 yds., which are considered exceptional. But these are all quite relative exceptions, for fast trains are found to be run on grades of 1.5 per cent., and curves of from 437 to 383 yds. The question of grade is not a reason for relaxing speed. On curves the case is different. Some reply that they strengthen the track on curves by increasing the number of ties, by employing rail braces or using more screwspikes or other fastenings; but these re-enforcements are not confined to exceptional curves, and it may be said, in fact, that they are gradually being extended to all curves and, in fact, to tangents where traffic is heavy, because the slight increase in first cost is soon more than made up by the greater security and the diminished cost of maintenance.

Only two special arrangements for exceptional curves have been reported, and these are from England and are the addition of a guard rail in the case of a number of railroads, and the tying together of parallel tracks on the Great Eastern. The guard rail mentioned is placed along the inside rail of the curve to increase the transverse rigidity of the track and to protect the outer rail of the curve from the horizontal thrust; but it is a costly arrangement and it is a question if the fact that the flange-way between the two rails, making a place liable to catch falling obstacles, does not increase the danger of derailment, making this device worse than useless. The idea of tying together the two tracks may be efficacious, but it adds to the difficulty and cost of laying track and of repairs, and of course it is not applicable to single track, where one is likely to find the sharpest curves. So, on the whole, so far as curves and grades go, no means seem to be taken to avoid slackening of speed other than general means of strengthening track, which subject is treated under the first question, to be reported by another delegate.

The only track apparatus which there is occasion to pass without slackening speed is switches, frogs and crossings, but these arrangements are found in double track junctions and their study belongs rather to question No. III., to be reported upon by another delegate. It is hoped, moreover, that that reporter will get more explicit replies than Mr. Sabouret has received. The sum of these is that the apparatus employed on lines of fast traffic is essentially the same as on other lines and that the sole special precaution is a very careful maintenance. But surely the comfort of travelers is increased by such arrangements at switches and crossings as will avoid shock; and so will the life of the material in track be increased if there is no shock felt; and it is a fact, taken altogether, this result comes nearer realization in England than anywhere else. There running at high speed without oscillation and without shock through immense station yards, full of tracks and track apparatus, is certainly one of the facts which oftenest strikes the foreign engineer who journeys for the first time in that country. Let us seek, therefore, the causes which have placed the English roads in advance of those of the continent in this respect.

Two principal causes are seen; the first is in the standard track itself, and the second is the special organization under which track material is made. The double head rail weighing from 96 to 108 lbs. a yard, lends itself readily by its shape and its great stiffness to the construction of the principal parts of the track material, switch points, frogs, crossings, etc. The cutting and the assembling of the parts is easy and inexpensive, and to each element can be given, without much extra expense great length and great stability, without excessive rigidity, and also strong joints. The standard rail chair, weighing 39 to 58 lbs., is another excellent model of heavy chairs which complete the assembling of the various parts and assures a robust attachment to the ties. Finally the use of large and long ties, perfectly dressed, completes these excellent arrangements.

But this is not all. Having this well-chosen material, great perfection of form is necessary to avoid shocks at the critical points, and this perfection is achieved by the entirely special organization of the English companies. Every great system has an engineering staff with offices and shops charged with the duty of making and putting in place its track material. A visit to the great English station yards will quickly show you the reason for this organization. In these stations in the heart of towns, the space is used to the extreme, and one could not get the most out of the space with a restricted number of types of track material, which is the usage on the continent. The special conditions impose for each piece of track a new design, and careful drawings and even wooden models, are necessary to arrive at perfection in proportions and dimensions of the parts.

If we add to that that England is the one country in the world where the engineer has most completely emancipated himself from the "invariable type" it will be easily understood how the English companies have been driven to organize for track work a special engineering service, and it will be understood that such special organization having been established it necessarily goes on to the perfecting of the special work for which it is established.

But should this example be followed on the continent? Probably not. In general we do not lack space in our stations and there is no call for indefinite variation from the standard types of track material.

Coming back to the subject of the report one gathers from the responses to the circulars that if the companies have not all track apparatus of the same value, nevertheless almost all of them answer that one can pass over their tracks at the highest speeds and without slackening, but exception may be made in the case of facing point switches. If approached in the trailing direction switches are never in themselves considered as a cause for slackening speed, but where they are approached from the point it is general to employ facing point locks. Some of the companies require reduced speed at facing points even when they are locked with facing point bolts, but this practice comes rather from the perils of train movement than from doubt of the security of the track itself.

Drawbridges are of minor importance in this report, as not many of them are found on great roads. In England, Belgium and Holland, where a few are encountered, they are never crossed without slackening speed. In France, the Northern Railroad Co. is the only one which has drawbridges, and this railroad company and the Pennsylvania Railroad Co. are the only ones which reply that they have ceased to require slackening of speed at drawbridges. This has necessitated careful arrangements for the protection of drawbridges by special drawbridge locks, as well as by interlocked signals.

The replies concerning slackening speeds at level crossing of highways are entirely negative; that is, they amount simply to saying that such reductions of speed are made but that they do not apply especially to fast trains.

On many lines all trains are required to slacken in passing station yards or stations. It is generally admitted that double track stations can be passed at the full speed of fast trains, provided that there are no facing point switches or that facing point switches are properly protected. It is on single track lines, however, that this matter becomes the most important, for fast express trains are seldom practicable on such lines without passing many stations without slackening. The rule with most of the continental companies is to make all trains stop at a station if it is a passing or meeting point. On some lines, especially the Gothard Line, express trains are permitted to pass such stations without stop, but with speed much reduced, if the meeting train has already reached the station.

Mr. Sabouret sums up his conclusions as follows:

Exceptional grades and curves when they are run at high speeds without slackening, receive no special reinforcement.

Most of the railroad administrations admit the passage of fast trains without slackening over switches, frogs and crossings, over level crossings, through turnouts and double track stations without resorting to other means of protection than those employed for ordinary trains.

The passage of single line stations without slackening is admitted on a great many lines. The means adopted to make this safe are essentially matters of train regulation.

The passage of drawbridges at high speeds is permitted by several administrations.

Some Cars for the Hunt Railroads.

It can hardly be necessary to tell our readers what the Hunt system of narrow-gage railroads is. This equipment is manufactured to standards and kept in stock—track and rolling stock complete. The track is made to a gage of 21½ in., the standard curves having a radius of 12 ft., and all the necessary track fixtures, such as switches, frogs, turntables, etc., being furnished for the special gage and rolling stock. One peculiarity of the system is that the flanges of the wheels are outside, the gage line of the rail being therefore the outside line of the head. On the curves the outside rails are arranged with a supplementary bearing which receives the wheel flanges, thus raising the outer wheel so that on curves the bearings of the two wheels on one axle lie in an ele-

ment of a cone instead of a cylinder. This gets rid of a good deal of slipping and consequently reduces the power necessary to haul the cars around the curves.

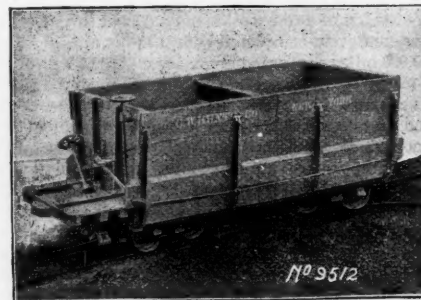


Fig. 1.—Special Car, Hunt System.

Besides this arrangement the axles have a radial movement. Two recent special cars are shown in the engravings. Fig. 1 is a two-ton cable railroad car built for the terminal coaling station of the Boston & Maine



Fig. 2.—Hunt Car for Lartigue Track.

Railroad at Boston. Fig. 2 is a special car built for the National Harbor Improvement Works at Tampico, Mexico, to be used on the Lartigue single rail track.

Yard Work.*

The yard is of the dimensions of 36 in., and some railroad yards seem to have been designed with this fact ever in view. With the very best that can be made out of it, the yard is an expensive luxury. It costs probably five cents to haul a car a mile. That is, the total expenses of a railroad divided by its car mileage will give about this figure. The figures for three representative yards, A being one where cars are received at a terminal to be distributed to different freight-houses and unloading-tracks, with a small portion going through; B being one where all of the cars pass through, merely being assorted in the yard, and C another terminal where a larger portion of the cars pass through than in A, show the cost, excluding everything but the wages of the yardmen, yard engineers and firemen, and cost of fuel and stores supplied to the engines, to be for A 25.6 cents, for B 13.2 cents, and for C 21 cents per car; and this expense has been put upon each car while advancing it in no case more than a mile and a half, with the average about a mile. Therefore, the assertion that yards are expensive, and that cars ought to be kept out of them, seems to be well grounded.

It has become quite a popular idea that switching must be done for points very far distant. For example: It is considered necessary that cars be made up at Columbus to go past Pittsburgh to Altoona, Harrisburgh, Philadelphia and into Jersey City in such order that no switching need be done at the latter point. This would be a proper thing to do providing there were enough cars leaving Columbus every day to make a train or two for Jersey City. Such a state of affairs, however, rarely exists, and it becomes necessary to have marshaling-points at frequent intervals. And in making up a train at one marshaling-point to go past the other it would seem to be a waste of energy to make the distribution farther than the next marshaling-point. For instance: We have four stations, A, B, C and D, located, say, at intervals of 100 miles. At D there are five directions in which cars can go, and, therefore, trains arriving at D should be in five cuts. It is certainly not necessary to start from A the cars which go through to D in five cuts, and, in addition to this, make the assortment necessary to enable the proper distribution at B, because we will have to handle the cars at the latter point in any event; it is wasteful to do this work twice. The only work required at A should be to place the cars for local points between A and B in station order and make the proper distribution to enable B to dispatch the cars from there. Following this out, B would distribute to C, and C would finish up and put the cars in proper position for handling at D. Neither is it advisable to arrange cars in station order on every train that goes out of a yard. To do this requires a great number of tracks and a large amount of switching; the better plan is to have all cars for local points between any two yards placed upon one track and sent out in special trains, one, two or three per day, as the amount of business will justify.

Every yard should be so arranged that road engines bringing trains in may be released quickly, sent to the roundhouse, and made ready for another trip; also, trains should be made up so that the road engine may waste no time from the roundhouse to the train and out onto the road. This should be one of the first considerations in laying out a yard. Yards should not be constructed to see how many cars they will hold, but for the purpose of passing the maximum number of cars through them in the minimum of time. Yard work can-

* A PAPER read by Mr. J. J. Turner, Superintendent of the Pittsburgh Division, Pittsburgh, Cincinnati, Chicago & St. Louis Railway, read at a meeting of the Central Association of Railroad Officers, Oakland, Mich., July 8.

If the conditions are such that we can strike the bottom of a 53 ft. grade one mile long, at a speed of 23 miles an hour, and work the above sized engine with an average mean cylinder pressure of 115 lbs., formula 2 will give us 839 tons. On tests the results were 858 tons. With a 17 x 24 x 62-in. engine and 30 mile velocity formula 2 gives us a rating of 738 tons. On actual tests we were able to haul 734 tons with a top-of-hill speed of 10 miles per hour. Where the grades are not too long we can make from formula 2 a table of engine ratings for the several portions of a line of railroad, which may be verified from time to time by the actual results. The latter, however, will be determined by the condition of the cars, the condition of locomotive and the skill of the engineman.

These ratings, after deducting from the value of T the weight of engine and cabin car, should be classified in accordance with the condition of engine, rates of speed and the weather. Class A rating is usually that for an engine in first-class condition at ordinary freight train speed. Class B, for engine in fair, and class C, for one in poor condition. Class D, for high speed freight trains, and classes E, F and G, for the engines during unfavorable weather conditions.

Having established the engine ratings, the next thing is to obtain the weight of trains. At stations where there are track scales this is readily done, by having the weighmaster, yardmaster or agent mark on the back of the car card, or on face of the manifest or in chalk on the side of car, the gross weight (car and lading) in tons. At stations where there are no scales, the weight of lading should be estimated and marked on back of the card. With these marked weights on cards, manifests or cars, it is a matter of small moment for the yardmaster or conductor to determine the number of tons and cars for the established rating of his engine. When the bulk of the traffic is in one direction, train loading on a tonnage basis in direction of light movement is useless. "Lights" however, should be avoided in all cases except when engines are needed at the other end of the road, it being more economical to run trains partially loaded at moderate speed, than to heavily load some and high speed your "lights."

American and English Locomotives in Japan.

As the result of an article which appeared in the Kobe (Japan) Herald for Feb. 27 entitled "Look to Your Laurels," and which reported an interview with Capt. W. H. Crawford, representing the Baldwin Locomotive Works, an interesting and rather personal controversy respecting the comparative merits of British and American locomotives appeared in subsequent issues of that paper.

Under the title mentioned the makers of English locomotives were advised to "look to their laurels" in the matter of locomotive building, the principal reasons for such advice being the statements made by Captain Crawford concerning the superiority shown by the Baldwin locomotives in a competitive test made at the Gotemba Grade on the Tokaido line, between Numadzu and Gotemba. This grade ascends at the rate of 1 in 40, and the trial in question was made upon it in May, 1894. The engines tested were as follows:

Dimensions.	American Tender Engine Class A—1893.	English Tender Engine Class B—1889.
Cylinders.....	18 x 22 in.	16 x 22 in.
Diam. Drivers.....	48 "	48 "
Number Drivers.....	6	6
Heating Surface-Boiler...	1,231 sq. ft.	991 sq. ft.
Fire Grate Area.....	18 "	16 "
Boiler Pressure.....	140 lbs.	160 lbs.
Weight on Drivers.....	33 tons, 11 cwt.	34 tons, 8 cwt.
Total Weight Engine and Tender.....	60 tons, 7 "	54 tons, 12 "
Tractive Force by Formula.....	20,790 lbs.	18,773 lbs.

The results of the test were:

Weight Hauled.		Coal Used.	
American.	English.	American.	English.
204½ tons.	195 tons.	3,243 lbs.	3,136 lbs.

Captain Crawford, in writing of the tests, says:

"The Baldwin engine pulled 204½ tons over the Gotemba Hill and did it with so much ease that one of the Japanese engineers offered to pull a much heavier load with a sister engine, and had the test been continued, would have done so. In fact, the American engine did haul 232 tons, exclusive of the weight of engine and tender, to within a few miles of the top of the incline, and over some of the most difficult parts of the hill, when she was brought to a halt, not from any inability to take the train farther, but from a cause which is plainly and fairly set forth in the report of the test, made by the Chief Superintendent of the motive department of the Government lines, and I do not think that any technical man would think of holding the engine responsible for that cause. Now what did the English engine do? She tried to haul 200 tons over the hill and failed although assisted on the most difficult part of the grade by another engine. She then hauled a train containing one car less over the hill, but with every particle of her power expended, that is, with the throttle wide open, the reverse lever in the last notch, and 160 lbs. steam. In other words, the English engine hauled 20 cars loaded with ballast to the top of Gotemba grade under the above conditions. The Baldwin engine hauled the same 20 cars and two more added to it, to the top of Gotemba grade, and did it with 139 to 140 lbs. of steam, and the reverse lever in the fifth notch, or in other words with a large margin of reserve power left. So much, indeed, that the same engine hauled 25 of the same loaded cars to within a few miles of the top of the hill when she stopped as stated and from the cause as explained in the Chief Superintendent's report: 'Now as to the coal consumed during this test: The Baldwin engine hauled the 20-car train, which was the maximum pull of the British engine, with about 4 per cent. less fuel than the latter, and for a corroboration of this, I again refer '—' to the official report.'"

We find in the further correspondence which the article of the Herald brought forth, some data taken from the Government reports, and adduced as evidence of the superiority in performance of English locomotives on the Tokaido line. Besides the engines of the A and B class, already described, there are in use on this road, two other classes of engines, C and D. The class C engines are of British make and have 17 x 22 cylinders, 17 sq. ft. grate

surface, weight on drivers, 33 tons 15 cwt.; total weight engine and tender, 61 tons; tractive force by formula, 21,193 lbs. In other respects they resemble the class B engines. Those of class D have 16 x 24 cylinders, are tank engines, with 1,000 sq. ft. heating surface and 15 sq. ft. grate surface. Their boiler pressure is 140 lbs., weight on drivers, 37 tons 5 cwt.; total weight engine and tender, 44 tons 15 cwt. Their tractive force by the formula is 17,920 lbs. The engines of class A are all Baldwin locomotives, of which there are about 71 in use in Japan. The others are all of British make. Concerning the performance of these engines on the Tokaido line, between Yamakita and Numadzu, which includes the Gotemba Grade, we have the following record, covering a period from April 1890, to the end of September 1894.

TABLE I.		Coal per	Oil per 100	Average
Class.	Miles.	mile,	miles,	cars per
A.	2,011.0	73.54	13.78	14.28
B.	467.855	57.35	11.41	15.16
C.	13,681	63.34	21.51	14.11
D.	75.85	51.76	10.20	14.83

Of the engines whose performances are thus lumped there are one of class D, three of class C, and six each of classes A and B. Of the latter, those of class A (American) have together been in service only 124 months, or an average of 20.8 months per engine of the 53 months covered by the above record. This is because they were more recently purchased. The class B engines (English) have together served 279 months, or an average of 46.5 months per engine. This accounts for the large difference in total mileage shown by the table. The mileage per engine per month is: class A, 1,936 miles; class B, 1,677 miles, which is in favor of the American locomotive. The cost per mile for coal we should expect to find greater for the American engine, as it is, but it would be of interest to know how it compares with tonnage. No figures of tonnage hauled are given, however, and since four of the American locomotives have been in service only since February, 1894—that is, at most, eight months of the time included up to September, 1894, while none of the English engines of class B have been put on the road later than July, 1891, it seems hardly a just comparison of results, since conditions of traffic, operation, etc., have probably changed in the past few years. Taking three of the Class C engines, started in June, 1894, and comparing them with three Class A. (American) engines put on the road in February of the same year, we have:

Class A.—American.			Class C.—British.		
Coal per	Oil per	Average	Coal per	Oil per	Average
mile,	100 miles,	No. vehicles	mile,	100 miles,	No. vehicles
lbs.	pts.	per mile.	lbs.	pts.	per mile.
68.9	17.98	14.40	66.55	20.08	14.19
79.9	16.30	14.77	66.45	20.02	14.90
70.1	18.45	14.99	60.75	19.38	13.36

These engines compare much more nearly in weight, size and time of service. The tables do not strike us as being very valuable, since they lump results, and do not show varying conditions. Records of performance of engines for the same length of time and service, showing tonnage hauled and coal used per ton mile would be of more use.

The Richmond Compound Out West.

July 2, at the invitation of Mr. T. H. Symington, of the Richmond Locomotive Works, a party of railroad men took a ride on the Richmond compound locomotive which is undergoing a trial on the Chicago, Rock Island & Pacific. The run was from Blue Island west to Winooka, 35 miles, and the train consisted of 40 cars, the total weight, exclusive of the engine, being 1,029 tons. This was hauled easily the whole distance, about eight miles being an ascending grade of 24 ft. to the mile. The engine was worked compound all the time, the emergency feature of working it as a simple engine not being needed. It is said that this engine has hauled a train of 51 cars, the total weight being 1,570 tons.

The engine, which we have described before, is a two-cylinder compound, with cylinders 19 in. and 30 in. x 24 in. It is of the 10-wheel type, weighing 143,000 lbs., of which 115,000 lbs. is on the drivers. The diameter of drivers is 62 in. and of truck wheels 30 in. The amount of heating surface is: Firebox, 140 sq. ft.; tubes, 1,782 sq. ft.; total, 1,922 sq. ft., and the grate area is 31.6 sq. ft. The boiler is an extended wagon top with radial stays, and carries a steam pressure of 200 lbs.

The design is different from the 10-wheel compound illustrated in the Railroad Gazette of March 9 and June 15, 1894, but the compounding feature is the same with one exception. This a small valve placed in the steam pipe leading from the boiler head to the intercepting valve. Through this pipe live steam is admitted by the engineer to the back of the emergency valve, which causes the engine to work simple. This new valve, which is put in this pipe, is in such a position that when the reverse lever is in the corner notch, the reach rod rests on the valve stem and opens the valve. As soon, however, as the engine is hooked up, the reach rod is withdrawn from the valve and it closes automatically. The object of this is to prevent the engine being worked simple except when the reverse lever is down in the corner.

The engine is of a very neat design and steams well. The easy way in which the train was handled excited the admiration of all who were on board. Before leaving the Rock Island road it will be tried in fast passenger service also. It has been tried on the Chesapeake & Ohio and Pennsylvania railroads, but the results of the tests made on the latter have not yet been made public. Some indicator cards taken from this engine while on the Pennsylvania are shown in another column.

Smokebox Experiments in Europe.

We have before this given an account of Mr. Sauvage's report on boilers, fireboxes and tubes, to the International Railroad Congress (see Railroad Gazette, Jan. 11, 1895, p. 17). We now give a further account of that part of the report which refers to smokeboxes. Mr. Sauvage says that it was for a long time considered that smokeboxes of locomotives should be of somewhat restricted dimensions, but within the last few years the extension smokebox has come into almost general use in North America. The reason for this extension is more particularly that of providing ample space for an effective spark catcher and for the collection of cinders. A certain number of European roads have tried these boxes, but the experiments have not been followed by general use. "Even in America itself the principle upon which the arrangement was based does not now appear to be so generally admitted as sound. . . . As a result of the different experiments carried out, it may be said that any normal increase in the size of the smokebox does not improve the draft or offer any direct advantage."

Some of the conclusions reached in the report are: "The influence of varying the capacity of the smokebox is inappreciable. Extension smokeboxes of American type, which have been tried by many European administrations, do not seem to give any better results than the ordinary smokebox. It therefore appears advisable to retain the use of the latter arrangement."

"No evident superiority can be assigned to any particular form of chimney; those which are slightly conical in shape (of small diameter at the lower end) appear to be favored. It is advisable to prolong the chimney toward the interior of the smokebox, giving this extension the form of a cone; the nozzle of the blast pipe should not in this case be much higher than the top row of tubes."

"No form of spark arrester can be said to offer advantages. All obstruct the draught without being wholly efficacious; the ordinary spark arrester, made of wire, suffices in most cases."

"In the different systems of regulating the blast, the annular disposition appears to be slightly the best; it, however, becomes a little complicated, if a variable section for the blast pipe, though otherwise desirable, be adopted."

"All exhausting through single blast pipes should be variable. The variation should not, however, be carried to such a point as to abnormally reduce the blast pipe section; it is doubtless the lack of a suitable limit which has brought the use of variable blast into disrepute as being either injurious or useless. A simple mechanism with two controllable valves appears quite suitable. Attention may be recalled to the rule mentioned as to the height of blast pipe; it should not be much higher than the upper row of tubes, even if the chimney is not extended into the smokebox."

Speed has no noticeable effect upon the production of steam; in other words, with equal weights of steam exhausted per second, and the same pressure in the cylinders at the start of the pre-exhaust, the greater or less frequency of the exhaust impulses is a matter of indifference. This fact is clearly proved by the action in service of two-cylinder compound engines."

It is evident, from these conclusions by Mr. Sauvage, that locomotive designers in Europe are as much at sea, in the matter of a proper location and size of exhaust pipe and smoke stake, as they are in this country. It is also noticeable that the long smokebox is not looked upon with favor. In the main, the conclusions do not conflict with those reached by the Master Mechanics' Committee in their report of last year.

Six-Roll Double Cylinder Planing and Matching Machine.

The machine shown in the accompanying illustration is the largest and heaviest planing and matching machine made by J. A. Fay & Co., Cincinnati, Ohio. It is made in three sizes, to plane two sides up to 24 in., 28 in. and 30 in. wide and 10 in. thick, and match or joint material up to 18 in., 22 in. and 24 in. wide, respectively.

The journals, shafts, gears, screws and bolts are made to standard sizes, which, with a system of interchangeable parts, enables duplicate parts to be supplied on short notice. The cylinders are forged steel and are slotted on all four sides. The journals are 2½ in. in diameter and are lead ground. The bearings are exceptionally long. The upper cylinder has its bearings yoked together from above and planed to fit cored uprights, cast to a solid bed plate, and bedded in a groove which retains them in line. These yoked bearings carry the pressure bar over the lower cylinder which, while also having an independent adjustment, falls with them. This pressure bar, after being set to suit the cut of the lower cylinder, requires no other adjustment for any variation in the thickness of the cut; an important item in a machine provided with a power-raising attachment. The lower cylinder runs in a heavy frame, adjustable to suit the cut, and has pressure bars on each side of it.

The power-raising attachment is so arranged that the upper cylinder and feed rolls can be raised or lowered together, or that they may be instantly thrown out of gear and any desired adjustment made by hand. When the upright lever shown is thrown forward, it unlocks the upper cylinder and tightens the belt operating the raising attachment, and another lever on the end girt, conveni-

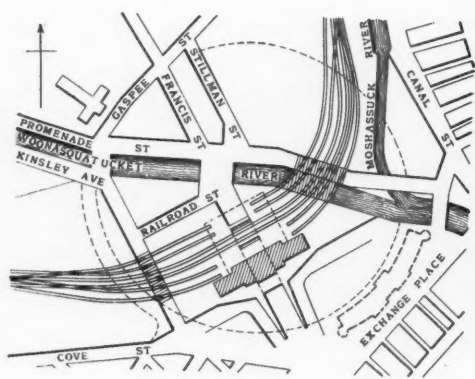


Fig. 1.—Map of Cove.



Fig. 2.—Bird's-Eye View of Providence Terminal.

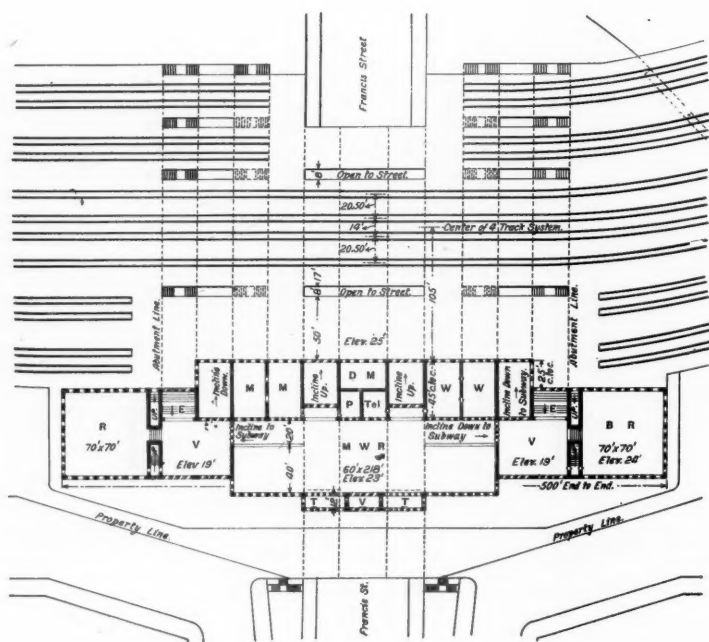


Fig. 3.—Plan of New Union Station.

RR., Baggage Room; DM., Depot Master; E., Exit; MM., Men's Room; MWR, Main Waiting Room; P., Parlor; R., Restaurant; T., Ticket Office; Tel., Telegraph; V., Vestibule; WW., Women's Room.

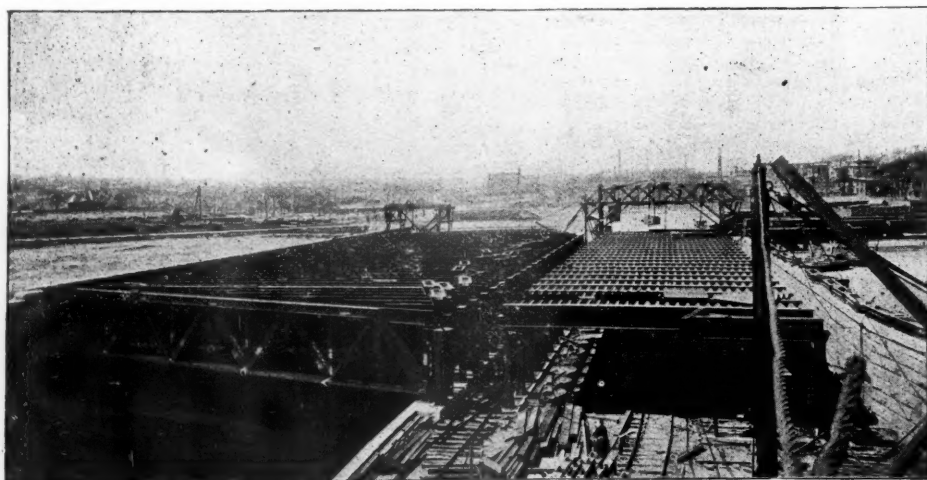


Fig. 6.—View of River and Street Bridges, Looking West.

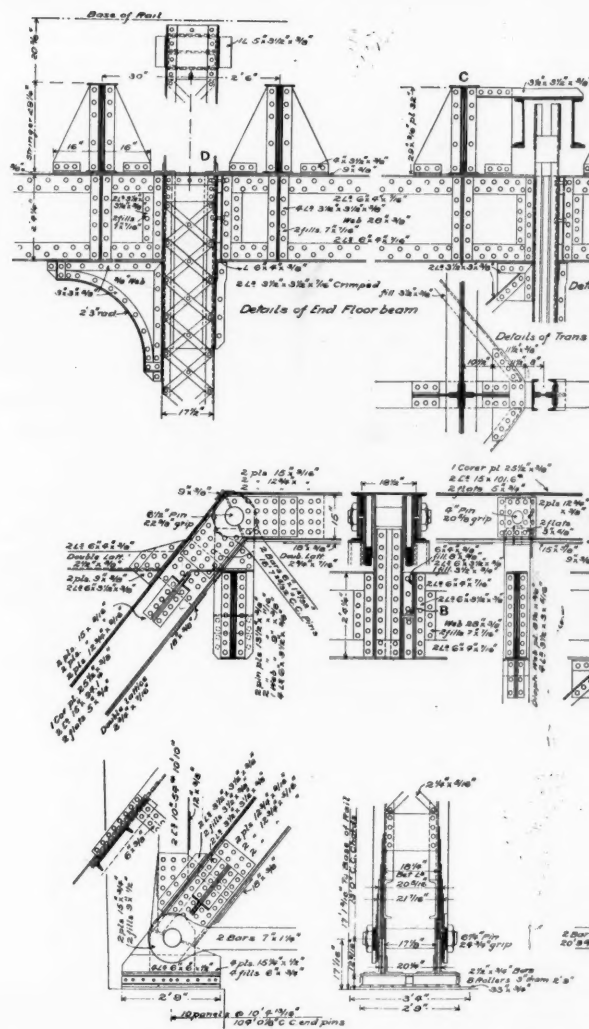


Fig. 7.—Details of Construction of

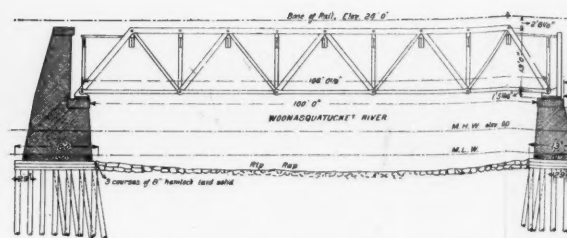
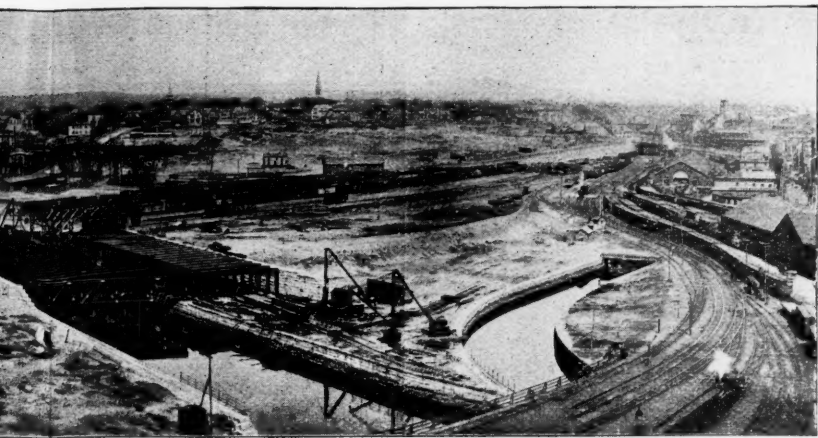


Fig. 4.—Cross Section of Foundations for the P.



Providence Terminal Improvements, Taken April, 1895.

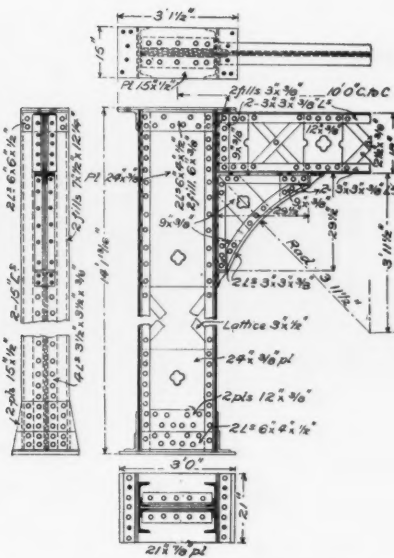
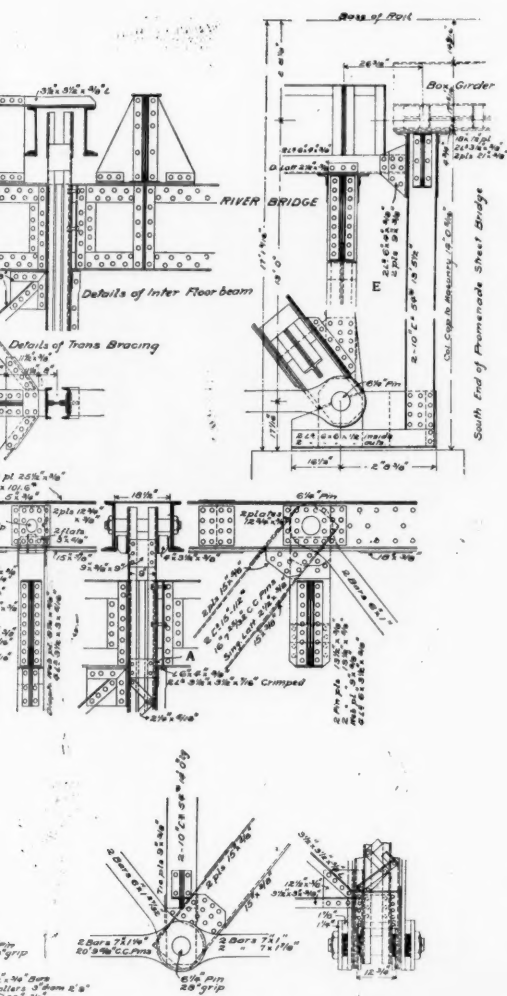
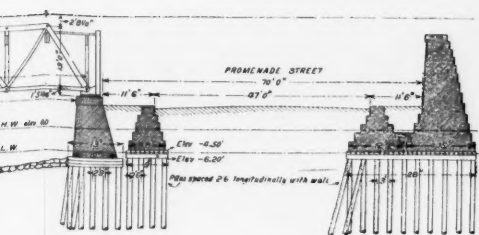


Fig. 9.—Details of Column and Bracing, Promenade Street Bridge.



Construction of River Bridge



Construction of the River and Street Bridges.

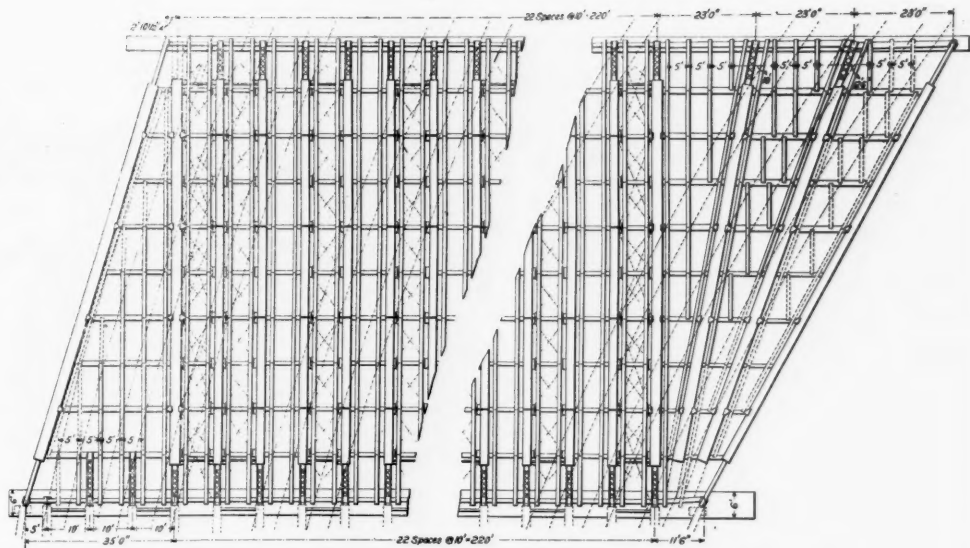


Fig. 5.—Plan of Woonasquatucket River Bridge, Showing Typical and Skew Girders.

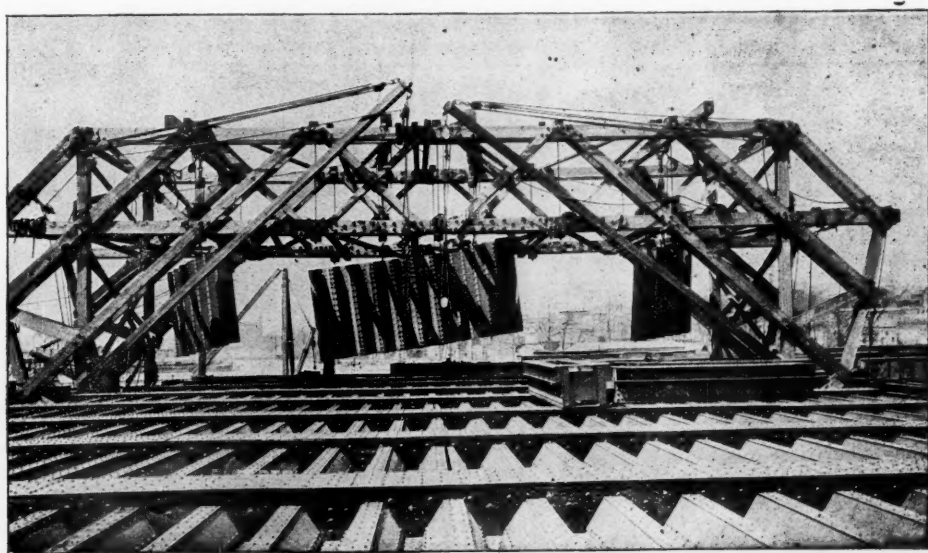


Fig. 8.—View of Promenade Street Bridge, Showing Trough Flooring.

ent to the operator, throws the friction in and out and raises or lowers the cylinder and rolls as the lever is thrown one way or the other. A gage is placed on top of the side frame in a position to be easily read by the operator. Suitable stops are provided to prevent accidents arising from the cylinder and rolls traveling beyond a safe point. Ball bearings are placed under the upper cylinder, screws rendering them easy of adjustment by hand when desired.

The arbors of steel 12½ in. in diameter and 14½ in. where the heads are applied, have each three bearings, one of which is placed at the top of the spindle which can readily be removed for changing the heads by simply removing one bolt.

The weighted matcher clip, with steel chip breaking lip, is hinged to the matcher hanger and a uniform pressure maintained by means of the weight. Regular matcher heads of gun metal with steel screws and solid milled matcher cutters, or Shimer matcher heads, are furnished with the machine as may be ordered.

Shaving hoods are fitted to each hanger about the cutter heads, to direct all shavings away from the machine. These hoods are convenient in attaching exhaust pipes for the removal of the shavings by means of an exhaust fan. Pressure dogs are placed after the cut of the matcher heads to hold the material firmly while being matched. The matching works are placed after the lower cylinder, the material thus being brought to an even thickness before being operated on by the side cutters.

The feed works consist of six rolls, 7 in. in diameter, and with large journals, one pair, placed after the

The following table shows the amount of new track laid in the first half of 1894 and 1895:

	1895.	1894.		1895.	1894.
Alabama	20	3	New Jersey	35	75
Arizona Territory	64.6	121	New Mexico Territory	75	40
Arkansas	25.5	49	Idaho	26.3	20
California	23.5	24	New York	18.5	80
Colorado	7	74	Ohio	29.5	122
Florida	67.5	25	Oklahoma Territory	35	83
Georgia	8	124	Pennsylvania	47.8	11
Illinois	14.9	52	South Carolina	11	15
Indiana	41.5	52	South Dakota	11	100
Iowa	0.4	—	Tennessee	97	17
Kansas	18	—	Texas	4	19
Louisiana	2	65	Utah Territory	13	69
Maine	14	105	Virginia	19	76
Massachusetts	9.5	3	Washington	23	—
Michigan	8.4	18	West Virginia	13	—
Minnesota	3	19	Wisconsin	19	—
Mississippi	17.5	53	Wyoming	—	—
Montana	102	102			
New Hampshire	7	7	Total, United States	641	495

NORTHERN STATES, EAST OF THE MISSISSIPPI.

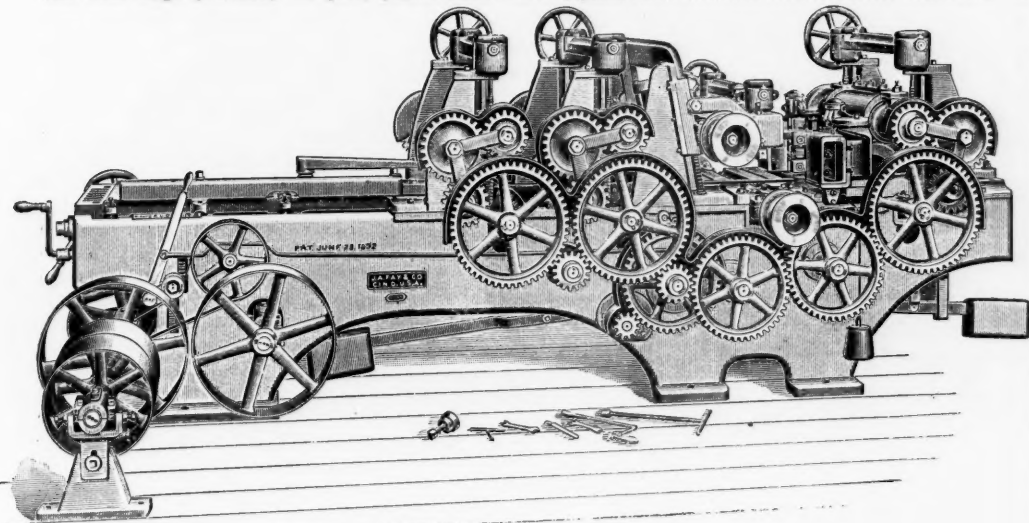
Maine.	
Rumford Falls & Rangeley Lakes—From Rumford Falls north to Houghtons, 10 miles south of Rangeley Lakes.	14
Total	14

New York.

Long Island—From Port Jefferson east to Wading River, on North Shore division, 11.3 miles; from Bridgehampton east to Amagansett, on South Shore division, 10.0 miles; a total of	21.3
Unadilla Valley—From end of track laid in 1894 south of Bridgewater to New Berlin	5
Total	26.3

Pennsylvania.

Cammal & Black Forest—From Perry Station to Harris.	3
Coudersport & Port Allegany—From Coudersport to Ulysses, Pa.	24



Fay Six-Roll Double Cylinder Planing and Matching Machine.

matcher works, keeping the board in a straight line and feeding it entirely away from the machine. The feed rolls, mounted on planed upright stands, are fitted with socket joints and connected at each end by heavy expansion gearing with double or outside links, and are heavily weighted. The weighted levers are inside the machine. The front platen has two rollers in it to relieve heavy timbers of friction, and this platen is arranged to admit of using the regular arm for holding the material against the guide, or a wooden lever, as preferred. Ordinarily two rates of feed are furnished with the machine, 41 and 56 ft. per minute, respectively, but other speeds are provided if desired. Each machine weighs 15,000 lbs. The countershaft has tight and loose pulleys, 16 x 10 in., and should make 1,000 revolutions per minute.

Track Laid in the United States to July 1.

We publish below a statement showing on what railroad lines new construction work has advanced far enough this year to make a fair start with the track-laying. This record shows that 637 miles of railroad were built in the United States in the first six months of 1895. This is an increase of 151 miles over the new track built in the first half of 1894, when only 1,761 miles were built in the whole year, being the smallest addition of new track made in any year since railroad building became an important factor in commercial affairs. The increase in 1895 for the first half year is 23 per cent., nearly one-fourth more than in the same six months of the previous year. An increase of 150 miles is not of much consequence in itself. Only a few years ago, several companies were building twice that amount of new track every half year, and a dozen or more different companies built as much in the year. But the relative increase of one-fourth in the amount of new track laid is a hopeful indication of the substantial change for the better in new railroad building which has been brought about. The record of new track laid gives little evidence of the much greater activity in railroad building which has now begun in various parts of the country. A year ago, practically every company which had started an extension of any consequence was preparing to stop work. At the present time extension work is being taken up by old companies, and, what is better, new companies are able to put their lines under contract and complete them.

Pennsylvania—From Downingtown to Thorndale, ¼ mile; from Bird-in-Hand to Conestoga, 2 miles; from Salina to Mr. Joy, 1½ miles; a total of	3.5
Phillipsburg & Houtzdale Con.—From Houtzdale to Ramey	3
Portage Creek & Rich Valley—On extension from Portage Creek	2.5
Pittsburgh & Lake Erie—From West Elwood Junction to Elwood City	6
Susquehanna & Buffalo—From end of line, westward	5
Thompson Run R. & Coal Co.—From Elwood Junction to Thompson Run coal mines	5
Total	47.8

Indiana.

Chicago, Indiana & Eastern—From Fairmont to Mathews, in direction of Muncie	12
Indiana, Illinois & Iowa—From Washington street, South Bend, to a connection with the Michigan Central R. R.	2.9
Total	14.9

Ohio.

Baltimore & Ohio—On Cleveland, Wooster & Muskingum Valley, from former terminus at Wooster south to Millersburg	18
Ohio Southern—Added to Cincinnati to Extension	4.5
Pittsburgh, Shenango & Lake Erie—From Conneaut to Conneaut Harbor	2
Toledo & Ohio Central—From W. Broad street to S. High street, Columbus, O.	3
Total	27.5

Illinois.

St. Louis & Eastern—From Marine to Alhambra	8
Total	8

Michigan.

Manistee & Northeastern—Extension of Baer Creek Branch 2 miles, other branches 4 miles, a total of	6
Toledo, Ann Arbor & North Mich.—From South Lake to George, Mich., 1¼ miles; from Temple to Clarence, 2¼ miles; a total of	3.5
Total	9.5

Wisconsin.

Chicago, Milwaukee & St. Paul—On Wisconsin Valley Division from Minocqua west to Star Lake	19
Total	19

SOUTHERN STATES, EAST OF MISSISSIPPI.

Virginia.

Chesapeake & Western—From Harrisonburg west to Dayton	4
Total	4

West Virginia.

Charleston, Clendennin & Sutton—From Clendennin to Twin Shoals	5
Kelly Creek Improvement Co.'s R.R.—From Cedar Grove to Finley and Thomasville	6
Father—From Father to Trap Fork	1.5
Wheeling B. & Term.—From Riverside Iron Works to Wheeling Steel Works	5
Total	13

North Carolina.

Aberdeen & West End—From Candor to Star Junction	5
Henderson & Brevard—From Hendersonville southwest to Moore County—From Flynn west to Craigtown	8.5
Total	13.5

Georgia.

Atlantic Short Line—From Bruton to Stillmore	38.5
Brunswick & Pensacola—From Folkston to Camp Cornelia, in Charlton County	11
Darien & Western—From Creech to Darien, Ga.	12
Stillman Air Line—An extension south of Collins	6
Total	67.5

Alabama.

Hollins, Heflin & Sylacauga—From Hollins south to Crawford	20
Total	20

Florida.

Peace River Phosphate Co.—From Liverpool north toward Arkadia	7
Total	7

Mississippi.

Chicasha & Jackson—Extension of main line from near Chl ora in direction of Laurel	3
Total	3

Louisiana.

Kansas City, Watkins & Gulf—On extension beyond present terminus	2
Total	2

NORTHERN STATES, WEST OF THE MISSISSIPPI.

Minnesota.

Duluth & Iron Range—From McKinley to Fayal	8.4
Total	8.4

Iowa.

Mason City & Ft. Dodge—From south end of track at Lehigh	0.4
Total	0.4

Kansas.

Kansas City Suburban Belt—On Union Terminal Railroad from Central avenue to Kansas avenue, in Kansas City, Kan.	1
Missouri, Kansas & Texas—On Southwestern Terminal, 17 m., from a point seven miles south of Parsons to coal mines of Cherokee county	17
Total	18

Missouri.

Paragould & Southern—From St. Francis River (State line between Missouri and Arkansas) to Cardwell, Mo.	2.5
St. Louis, Kennett & Southern—From Kennett to Caruthersville	15
Total	17.5

Arkansas.

Kansas City, Pittsburg & Gulf—From Siloam Springs south across Indian Territory line, 3¼ miles; on Texarkana & Ft. Smith Division, from near Wintrop north to Hcratio, 13 miles, and south from near Texarkana, 8 miles, a total of	25.5
Total	25.5

Indian Territory.

Choctaw, Oklahoma & Gulf—From South McAlester terminus of present Eastern Division, west to South Canadian River on line to connect with Western Division near Oklahoma	27
Kansas City, Pittsburg & Gulf—From crossing of Indian Territory line near Siloam Springs, south to Barnes Fork, beyond which point the line again enters Arkansas	14.5
Total	41.5

Oklahoma.

Choctaw, Oklahoma & Gulf—From Oklahoma City east to Choctaw City and end of track, on connecting line between Eastern and Western Divisions	35
Total	35

Texas.

Galveston, La Porte & Northern—Houston to Harrisburg, 2 miles, and from Thayer to Dickinson Junction, 23.5 miles, completing line between Houston and Virginia Point, opposite Galveston, a total of	25.5
Gulf, Beaumont & Kansas City—From end of track laid in 1894 at Buna to Kirbyville (making 61 miles now completed)	21
Gulf & Interstate Ry. of Texas—From Point Bolivar, opposite Galveston, northeast towards Beaumont	6.5
Kansas City, Pittsburg & Gulf—On Texarkana & Fort Smith Division, from Texarkana south to beyond Sulphur River	8
Missouri, Kansas & Texas—On Wichita Falls branch, from Henrietta to Wichita Falls	15
Rio Grande & Northern Texas—From Chispa, on Southern Pacific, east of El Paso, to Nine's-six Canon	13
Paris, Marshall & Sabine Pass—From Harlton to end of track	2
Trinity, Cameron & Western—On Georgetown & Granger, out of Granger	3
Total	97

Utah.

Great Salt Lake & Hot Springs—From Centreville north to Farmington	4
Total	4

Arizona.

Gila Valley Globe & Northern—From terminus of road built in 1894, Pima to Geronimo	20
Santa Fe, Prescott & Phoenix—From end of track laid in 1894, 153 miles south of Prescott, to Mile Post 197, completing line to Phoenix	44.6
Total	64.6

California.

Southern Pacific—End of track laid in 1893, 7 miles south of San Luis Obispo to a point 25.8 south of San Luis Obispo, 18.7 miles; from Shorb on main line, into town of Pasadena, 4.8 miles; a total of	23.5
Total	23.5

Grand total for United States..... 640.4

Electric Power for Another Suburban Line.

The Chicago & Northern Pacific Railroad has made application for permits to equip its suburban lines running out of Chicago with electric power. The location of the power house and details of the equipment have not yet been decided on but it is the object of General Manager S. R. Ainslie to inaugurate a much better suburban service than the one at present, using steam locomotives. Mr. Ainslie says it is his intention to run the electric trains directly into the Grand Central station at Harrison street and Fifth avenue, and the lines to be affected by this change are the Chicago, Harlem & Batavia; the Chicago & Southwestern which connects with the main line at Oak Park and has its western terminal at Harlem avenue, and the Chicago Central which branches from the main line at Western avenue and runs to Blue Island and Harvey. The total length of these lines is about 35 miles.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The reduced-rate excursions from all over the country to the annual convention of the Young People's Societies of Christian Endeavor, which this year is held in Boston, have come to be a feature of the traffic world, and a demoralizing one. The reductions in rates and the arrangements of time limits were managed very smoothly this year, and the demoralization in regular rates, always liable to follow such a large and general reduction, seemed likely not to be very bad; but at the last moment a disturbance arose at St. Paul which promises to spoil the pleasure of a good many of the excursionists and waste some railroad revenue. The Canadian Pacific (Soo Line) in order to make sure of some of the business out of St. Paul, extended the time for returning from Aug. 2 to Sept. 15; the roads from St. Paul to Chicago could not resist the temptation to meet this concession, and they met it; but as soon as the New England roads heard that this had been done, they telegraphed West in vigorous language that they would not accept tickets thus extended without their consent. This message produced the desired result in some cases, but not in others, and the upshot of the matter was that on Saturday last there were large numbers of passengers in Chicago with orders for tickets for the remainder of their journey to Boston which could not be filled. The passenger had his choice of accepting a ticket good only to Aug. 2, thus interfering seriously with his plans, or of paying an extra sum for a ticket good until Sept. 15, thus, very likely, interfering seriously with his financial arrangements. This will be an object lesson in traffic management which ought to prove instructive to the public, though the remedy for the difficulty is so hard to devise and apply that one can hardly hope for any definite benefit from the experience-lesson. In freight rates a portion of the public seems to have at last learned, though we do not know how thoroughly, that stability of rates is more desirable than extreme cheapness; and now we have an illustration of the same truth in passenger rates; but it will doubtless be as hard to secure stability here as in grain tariffs. The fact that each passenger who has suffered from this mild fraud has a remedy at law against the company that sold him the ticket does not afford much compensation to the exasperated individual, and the rates are so low, even including the extra charge for extending the time limit, that the passenger is quite likely to run the same risk next year; so that any demand by the public, or any voluntary co-operation by the roads looking to a better agreement for future excursions, is scarcely to be hoped for. But absolute stability, both of rates and time limits, for at least three months at a time, is one of the plainest needs in this field, and if the railroads do not get together and understand each other better, so as to make a better combined impression upon the public, they may expect that these Christian Endeavorers, when they get into the legislatures a few years

hence, will try any compulsory legal scheme that happens to take their fancy.

The evils of instability appear, in still another phase, in a press dispatch from Oakland, Cal., which says:

The Christian Endeavor excursion train which left Oakland July 3 for Boston carries only about 10 per cent. of the members who originally intended to go. Ninety per cent. who remain say they are the victims of promises made to them on the part of the Southern Pacific that were not kept.

And yet it is not likely that any passenger agent told a lie; a little coquetting would do the same thing. Results of this kind can easily be produced simply by holding out a complication of inducements which the customer is too inexperienced to see through until he has built his hopes so high that when they are dashed he concludes that he has been cheated. The Interstate Commerce law seems intended to allow much more latitude in excursion fares and regulations than in those for ordinary passenger business, but if the Commissioners wish to try their hand at making the rules about publicity and precision of tariffs more effectual, they can probably do as much good just at this point as anywhere.

Train Resistance and Express Locomotives.

It is a striking fact, and almost a reflection on investigators of the mechanics of railroads, that so able and accomplished a man as Mr. Aspinall has been unable to gather for his important paper on Express Locomotives any useful facts about train resistance at high speeds. In his investigations he has met the stumbling block which has stopped a good many, as we have before explained. (See *Railroad Gazette*, March 28, 1890, pp. 207 and 216; March 18, 1892, p. 210; June 17, 1892, p. 450.) It is that the formulas given by most authorities for train resistance do not check up with the facts. The horse power required to pull the train, according to the formulas, is several times as great as the observed horse power of the locomotive when running. Unless there is some unknown force pushing the train, one must find in the indicated power of the locomotive the sum of all the different amounts of power required to overcome the different resistances. If the axiom that a whole must be equal to the sum of its parts still holds good, then the sum of all the resistances, when a train is moving, must be equal to the resistance overcome by the power developed in the cylinders. Take the case in point. Mr. Aspinall cites the Empire State Express at 100 miles an hour, for which Mr. D.

K. Clark's formula, namely, $\frac{V^2}{171} + 8$, gives a resistance

of 66.5 lbs. a ton. The weight of the Empire State Express is given as 283 tons, which by this formula requires a drawbar pull of 18,800 lbs., or a power in the cylinders equal to 5,000 H. P. It is needless to say that no locomotive has ever generated power at such a rate. It is important at this point to note that Mr. Aspinall has set the maximum horse power of the Empire State Express locomotive at from 1,200 to 1,400, or about one-fourth of that required by D. K. Clark's formula.

Mr. Aspinall thinks that the approximate train resistances given by Mr. D. L. Barnes in a paper before the Engineering Congress (1893), and which were given prior to that in the *Railroad Gazette* (see March 18, 1892, p. 210), are too low. But if one takes the 1,400 horse power given by Mr. Aspinall as the extreme maximum effort for the Empire State Express locomotive, and from this calculates the resistance at 100 miles an hour, he finds it as 18.8 pounds a ton, which corresponds within one pound a ton with the figures on the diagram given by Mr. Barnes. Mr. Aspinall has taken the conservative position of the mean between the two—or, rather not a mean, but at some indefinite point between the two extremes. He writes that his deduction from the Empire State Express data "points to the fact that Clark's and Du Bousquet's figures are too high, but, at the same time, the author is of the opinion that those of Barnes are too low."

The reader of Mr. Aspinall's report is still left to choose a figure for the train resistance between wide limits. Mr. Clark's formula gives the horse power required as 5,000. Mr. Barnes' diagram gives it as 1,500. Mr. Aspinall sets the maximum horse power of the engine at 1,400, which is less than the power required by the diagram.

The Physical Condition of Railroads.

The stockholder, the investor and the general student of railroad economics, can, as a rule, get but a moderate amount of information out of the annual reports of the railroad companies concerning the physical conditions of the properties. It is true that

he can oftentimes get more information than he thinks he can; but generally he must dig for it. He must get out the items for himself and make his own comparisons. Usually it is possible to get information as to changes in mileage of track, although it is by no means always possible to learn the very important facts as regards increase of sidings, which, in the convenient and economical running of a railroad, are about as important as the main track. It is almost always possible to know the gross amount spent for maintenance of track, and sometimes the items of expenditure for rail renewals and ties and ballast are reported separately. By a little industry one can compare these items year by year. Changes in weight of rail, however, are less frequently reported, and it is not usual to find definite statements as to the amount of ballasting done. Expenditures for bridges and buildings, in gross, are easy to pick out from the reports, and may be compared on a mileage basis for a series of years; but it is by no means the rule to report changes from year to year in the amount of wooden bridges and trestles remaining, and in the amount of embankment or of steel bridges and trestle built as a substitute for these temporary structures. The gross expenditures on rolling stock can usually be found, also the quantities of stock, which may be made comparable year by year by reducing the figures to a mileage basis. Still such comparisons almost always involve more or less labor, and if one has not access to files of annual reports they are ordinarily difficult to make; and so, even in case of the railroads that make the best reports, the actual physical condition of the property remains in comparative darkness.

The *Financial Chronicle* has recently announced its purpose to make a departure in its treatment of annual reports which will be a great convenience to its readers and which we may hope will lead gradually to more detailed reporting of essential facts. It is the purpose of that journal to incorporate in its customary abstracts of railroad reports a special table comparing items bearing on the physical condition, as for instance, the mileage of rails of various weights, the mileage of ballast of various kinds, the mileage of sidings, the length of bridge structures, the quantities of rolling stock, the expenditures under the various items of maintenance reduced to a mileage basis, the quantities of rails and ties laid per mile, the expenditure per car for maintenance and renewal, etc. The *Chronicle* says these facts, "which are meager at first, will be improved as time goes on;" and we are inclined to think that this will be found to be true. The demand for specific information will doubtless gradually lead to the habit of more specific and fuller reporting.

Doubtless one reason why reports are as meager as they are is the indifference of the buying public to such facts which, we imagine, is in the great majority of cases a more important element than the desire of officers of the railroad companies to conceal conditions. After all, very few people buy railroad securities on a knowledge of the physical condition of the properties or even of their probable earning capacity. The present Wall street price is a much more important factor in the mind of the purchaser than any of those factors the effect of which is likely to be realized in some remote time, and the present Wall street price has little to do with physical condition or actual earning power; it is much more a matter of temporary and more or less accidental conditions.

Railroad Organization.

I.

Two interesting documents resulting from the present International Railroad Congress are the reports on organization. The reporter for non-English speaking countries is Mr. Duca, General Manager of the Roumanian State Railroads. The reporter for English speaking countries is Mr. Frederick Harrison, General Manager of the London & North Western. A comparison of the two gives a new illustration of a radical difference in the intellectual make-up of the people of the different countries. Among the English speaking people the first instinct is simplicity and flexibility. Here the organization must adapt itself readily to varying conditions, and grow and change as needs develop. Among the continental people the first instinct is to elaborate a perfected and comprehensive organization, theoretically complete in its smallest details and invariable in its application. This is a fundamental difference to be observed in the two reports.

Mr. Harrison takes up first the railroads of the United Kingdom and second those of other English speaking countries. He treats the English organization in general terms; organization in the United States is treated by first describing generally that of the Pennsylvania Railroad, then mentioning the dif-

ferences between that and the organization of the New York Central, the Illinois Central, the Louisville & Nashville and the New York, New Haven & Hartford. This is followed by a short account of the organization of the railroads of Australia, South Africa, India and South America, with some general conclusions.

We should suppose that the reader of the *Railroad Gazette* must be somewhat familiar with English railroad organization. In times past we have frequently called attention to the admirable little book written by Mr. Harrison's predecessor in the management of the London & North Western, Sir George Findlay, the title of the book being "The Working and Management of an English Railway." While this deals specifically with the London & North Western, it gives a pretty comprehensive view of the theory and practice of English organization. Mr. Ackworth has also given us some insight into this part of English railroading in his excellent book, "The Railways of England." Probably we might mention, as one of the recent documents adding to general knowledge on this subject, a paper published in *Scribner's Magazine* for November, 1894, which described, in a summary but somewhat comprehensive way, the organization of the working staff of the English railroads.

It has seemed to us that the two most important peculiarities of the English railroad organization are the part taken in administration and control by the Board of Directors, and the large responsibilities given to the General Manager. The directors, are, of course, elected by the shareholders, and must themselves be shareholders; and under the law can hold no office of trust or profit under the company, and may not be interested in any contract with the company. This Board meets frequently, once a month as a rule, we believe, and is presided over by the Chairman of the Board, who is the nominal head, his actual power depending upon his knowledge and force of character. The Board is divided into committees, dealing with specific branches of the business, as maintenance of way and works, rolling stock, engineering, traffic, stores, finance, audit, real estate and law business. These committees have their chairmen, who are more or less specialists in the work assigned to them. The result of this arrangement is that the Board of Directors is in constant touch with the affairs of the property, and is in a position to control it. The meetings of the Board and the committees are usually attended by the responsible officers of the departments who report and advise, but the General Manager and Secretary are the chief and constant advisers, although the head of the legal department is sometimes a very active and important officer. Indeed, it sometimes happens that he is a man of such comprehensive knowledge and individual power that he takes an active part in pretty nearly all the affairs of the railroad company other than the running of trains.

The General Manager, as a rule, has powers and responsibilities larger than those of the General Manager of a railroad in the United States. Of course in both countries there are exceptions. In England he is the actual head of the railroad under the directors. He is the responsible man not only in the working of the road, but in matters of public policy. He combines in himself many of the duties and responsibilities which in our country are shared by the President, two or three Vice-Presidents, a General Manager, and perhaps a General Superintendent. The Chief Engineer of an English railroad company is responsible for the maintenance of road, of structures, and sometimes of the rolling stock, although on the principal roads there are separate officers in charge of the rolling stock department, and sometimes, indeed, the locomotive and car departments are divided. As we understand the English organization, although Mr. Harrison does not say this specifically, the Chief Engineer does not ordinarily report through the General Manager, which, if it is so, we should consider a weakness in the system, considering the peculiar position of the General Manager there.

Below the General Manager and the head of the engineering department are officers whose numbers, duties and titles vary according to conditions. Ordinarily, there is a goods manager who controls the freight department under the General Manager, also a superintendent of the line who has general charge of the working of all trains, and specifically of passenger traffic. Then the system is divided up into districts under divisional officers; sometimes there are separate division superintendents for the freight and passenger departments, and sometimes these duties are performed by one man. In the latter case, however, the officer in charge of the goods department is concerned only with tonnage and rates, while all matters of transportation and all the control of the outdoor staff are under the divisional superintendent in charge of the passenger department. Below these men are the station-masters whose duties are much the same as in this country, and the guards

(conductors) who have charge of the trains in transit. A very important member of the English working staff is the inspector, whose business it is to watch the road, the stations, the yards, the signal cabins and the trains, report on needs and irregularities, and generally to hold all subordinates up to the standard of efficiency and discipline.

The leading facts in the English system are direct control by a small number of shareholders acting as directors, who are responsible to the public and to the owners of the property; concentration of the executive responsibility in one head, and great flexibility in all the organization below the rank of General Manager. It is this latter fact which makes it impossible to describe accurately, in general terms, the English organization. The duties and powers of the officers vary with the capacity of the individual and the needs of the case.

It will be seen that in the main the English system is not very different from our own. There is the same theory of final control and responsibility of directors elected by the stockholders and the same delegation of their powers to executive officers, whatever may be the titles. We doubt, however, if the directors actually control matters in the United States as thoroughly as they do in England; but in both countries there are unquestionably directors who combine a high sense of duty with executive power, and there are others who are weak, shiftless or ignorant. We have never thought that laws or systems of organization could go very far to eliminate the human element in the administration of a railroad and to make the machine automatic, nor has it ever seemed to us that such a result would be desirable. After all, the responsibility for the conduct of the property must rest with its owners, and it is their business to choose the right kind of directors and then hold them to strict accountability.

The English method of administration, through one man who stands between the working staff and the directors, seems to be simpler, but after all it is a good deal a matter of titles. If the President has all the duties and functions of administration vested in him and distributes these duties and functions among vice-presidents and general managers, chiefs of traffic departments and chief engineers, the result is much the same. The titles are the least important part of the system.

In New South Wales, the railroads, being the property of the state, are controlled and worked by a Board of Commissioners responsible to Parliament and appointed for seven years. The Chief Commissioner there has great power, which, as our readers well know, has long been efficiently exercised by Mr. Eddy. Under these commissioners are nine officers, heads of departments, independent of each other and reporting directly to the commissioners. These cover transportation, engineering, stores, accounts, real estate and law; there is even an independent electrical engineer. Thus we see the Chief Commissioner is really president and general manager, and these titles do not exist in the system. The working staff below the heads of departments is essentially the same as in England.

The Government railroads of the Cape and of Natal are controlled first by the Minister of Public Works, but under him is a General Manager who has supervision of all branches, and five heads of departments report directly to him.

The Indian system is quite peculiar. Here the state guarantees interest on the capital invested, and therefore must control. This control is exercised in England by the Secretary of State for India and in India by the Governor-General. The Board of Directors sits in London, and includes a Government Director, appointed by the Secretary of State, who has a veto on all proceedings of the Board. There is no General Manager, but each company has an Agent, who is responsible to the company for all the affairs of administration, and acts under instructions from the London Board. He is, however, subject to the supervision of a government officer in India called the Consulting Engineer. All the other chief officers are subject to the Agent. Of these chief officers there are usually five at the head of what we call the transportation department, the engineering and motive power departments, accounts and stores.

In Australia the system has the distinct disadvantage of being subject to constant annoyance by Parliament, the politicians having been extremely active in recent years. Otherwise the system seems to be a very good one, the Chief Commissioner having great power and full responsibility. Much the same condition exists in South Africa. In India there is the double disadvantage of constant government supervision and of a non-resident Board of Directors. Mr. Harrison evidently did not feel himself called upon to comment on these elements or their effects, but we have no doubt that they have considerably retarded the development and efficiency of the Indian system.

In another article we shall take up the report for non-English-speaking countries.

Last Tuesday the property and franchises of the New York & New England Railroad were sold under foreclosure of the second mortgage bonds in the United States Court at Hartford, to Mr. Simpson, the attorney representing the Committee on Reorganization. His bid of \$5,000,000 was the only one made. This sale means nothing at all, so far as we can see, except the natural and logical progress of reorganization. The plan of the Reorganization Committee was put out in April of 1894 and was soon accepted by most of the security holders. It provides for a new company with \$17,500,000 new mortgage fives, \$5,000,000 new five per cent. non-cumulative preferred stock and \$20,000,000 new common stock. Ten million dollars of the new bonds is to be reserved to retire old firsts, but the committee may extend the old bonds at lower interest or leave them undisturbed. The old seconds are to receive for principal and interest either \$424 in cash and \$675 in new fives, or all cash for par and interest. Each share of old preferred stock, on payment of \$25, is to be exchanged for \$125 in new preferred. Each share of old common pays \$20 assessment and is exchanged for \$100 new common. A new company is incorporated to take the property and issue new securities. The necessary legislation in all of the several states in which the property lies has, we believe, been secured, and therefore there is no obvious obstacle to the completion of the reorganization, the new company having become possessors of the property under the foreclosure sale. Of course there is a great deal of speculation as to who owns the certificates issued to stockholders who paid the assessment on the stock, the quotation for which has advanced greatly in price within the last year, and suspicion rests strongly on the New York, New Haven & Hartford, also on Mr. J. Pierpont Morgan. Concerning this ownership, however, it is useless to speculate now, for the facts will soon be known.

The experiment of carrying fruit from Sacramento to Chicago in ventilated cars, without ice, which the Southern Pacific Company began a month or two ago, seems to have turned out well thus far. Trains have been run through between these cities in 120 hours, and the fruit arrived in good condition. We do not know how many shipments have been made, and there have been, we believe, one or two annoying delays to trains by wrecks, which caused some nervousness; but it appears that in the main the results are highly satisfactory, and the officers of the road call the scheme an assured success. As will be recalled by the reader, this enterprise, as noted in the *Railroad Gazette* of May 10, was started for the purpose of saving the great expense of furnishing ice and hauling it such great distances. The arrangements were made, of course, with the full understanding that the ventilation must be the best possible and the time quick; and this implied such an arrangement of schedules as would avoid all delays at yards or other places where the loaded cars would have to stand any length of time in the sun. Ventilation, without apparatus for forcing currents of air, obviously must depend in large measure upon keeping the cars constantly in motion. An officer of the Southern Pacific gives us the following particulars concerning the cars lately built for this service, and the manner of handling the freight. He says:

The cars, built by the Ensign Manufacturing Company are 34 ft. long with double shutters at top and bottom; they are double-walled and paper-lined, with a bulkhead at each end so fixed as to leave space for the free passage of air through the ventilated ends. In loading, slats are placed lengthwise of the car between the packages, so that between each tier of fruit packages the air can freely circulate from end to end. The strength of the current of air depends, first, on the speed of the train and secondly on the adjustment of the shutters. The shutters, with fine wire gratings, are arranged to exclude the direct rays of the sun, and the grating also excludes the dust sufficiently for practical purposes. No ice is used either in the loading of the car or during transit. The fruit is picked from the California orchards during the day and is transported to Sacramento during the evening hours, the local train schedules from the fruit districts being arranged to permit this. The through train is made up in Sacramento at night, and starts at midnight on its journey East. This arrangement is designed to give the fruit the benefit, as much as possible, of handling in the cool night air of California, where, however hot the day may be, the evenings and nights are always cool and well adapted to the packing of fruit or any other labor.

The slight reduction in the freight rates on cotton, for certain distances, which has been announced by the Railroad Commissioners of Texas for the railroads of that state, for the coming season, and which was briefly noted in our traffic columns last week, is an item of news of more importance than appears on the surface, for it indicates a degree of moderation in the spirit of the Texas Commission which comes in the nature of a very agreeable surprise to the railroad officers of that state. According to the law or custom prevalent in Texas, the Commissioners, before ordering a change in freight rates, issue a "proposed tariff" and then notify railroad men and all persons interested to come to Austin and present their objections, if they have any. In the present case the tariff proposed by the Commission contained sweeping reductions, as has been the case in so many tariff changes heretofore; but the arguments presented by the railroad men convinced the Commissioners that the proposed rates would reduce the income of the carrier out of all proportion to the benefit which they were likely to work for the producer, and they abandoned their proposition.

and practically adopted the suggestions made by the railroad men. The considerate tone of the Commissioners in their recent conferences also indicates that a much more harmonious state of affairs may be expected hereafter. This new attitude has been a great encouragement to the Texas roads in establishing their Car Service Association and the regulations for collecting demurrage on bulk freight when it is not promptly unloaded. In Texas, as has been the case everywhere else, consignees have a strong conviction that the use of cars for warehouses is a sacred right of such long standing that it ought never to be infringed. But the Commissioners have backed up the railroads and the railroads in turn have succeeded in following the detail rules of the Commissioners quite successfully. The Commissioners are soon to issue new general tariffs for all commodities.

Discipline without suspensions, which readers of the *Railroad Gazette* are now familiar with, from reports of the adoption of the plan on several railroads recently, is said by the *Toledo Blade* to be in force now on the Kansas City, Fort Scott & Memphis and the Chicago & Northwestern. Mr. Whittelsey, General Superintendent of the Toledo & Ohio Central, speaking of his own experience with the plan, says:

"A year's trial has demonstrated its superiority, and we have arranged to continue it. All deviations from the rules or good practice are made the subject of a record bulletin over the signature of the Division Superintendent. Such bulletins are consecutively numbered and posted on bulletin boards at division terminals and are allowed to remain thereon 10 days, after which they are transferred to an adjoining file for reference. These bulletins state briefly and without identifying the parties at fault the occurrence, how it happened, who was at fault, and how it might have been prevented, adding such comment as is necessary to fully educate the men on the subject referred to. Each case which is bulletined is made a matter of record, and is charged against the record of each man participating. A man is given a double page for his record, and each man's record is open for inspection at any time by the man himself, but not by others. When a man's record gets voluminous, he is called to the office and given a chance to explain why such is the case. We make dismissals for an accumulation of bad record. The men are given credit for such commendatory service as may be entered on their record. In cases of intoxication, habitual drinking on or off duty, unjustifiable collisions, and any persistent violation of the general notice of our book of rules is punished with dismissal forthwith.

"We would not under any circumstances go back to the old plan of suspension. I believe that the new plan strengthens the relations between the railway company and its employees.

"Mr. Darlington, of the Pan Handle, suggests a credit and debit system reducing all acts, good or bad, to so many days each. I consider this impracticable. We simply want the man's record, and by conscientiously weighing all entries decide his case."

The Pennsylvania road has recently had reports made by yard masters, throughout the system, showing the condition of all the company's freight cars as regards the law requiring grabirons and steps. The Receivers of the New York, Lake Erie & Western have applied to the Interstate Commerce Commission for an extension of the time in which they must comply with this law. In their application the Receivers say that of the 43,073 cars operated by the Erie about 60 per cent. are already equipped. On June 23, when the inventory was taken, 30 per cent. of these cars were on foreign roads. It is said that the Commission will have a hearing this week and that several roads besides the Erie will apply for modifications of the requirements of the law. The Wilmington & Weldon and several other roads in North Carolina ask exemption from the drawbar requirements for a number of logging cars which have drawbars only 21 in. above the rail. The Louisville, New Albany & Chicago and the Pittsburgh, Chenango & Lake Erie have asked for extensions of time, the first for six months and the other for three months. These petitions will be considered on July 22. A press dispatch from Chicago says that the roads there have held a meeting to see what attitude they should take before the Commission. A number of the roads have evidently allowed the requirements of the law to go unnoticed, to a large extent, because of their reduced incomes. It is said that the Burlington has 20,000 cars yet to be equipped with grabirons.

The change of gage of the Great Western Railway of England from 7 ft. to 4 ft. 8½ in. was completed a good while ago and due record was made in these columns. The old track, as must now be well known, was made of U rails on longitudinal sleepers. The work of substituting the standard English track—that is, bull-head rails on transverse ties, is now going on. The new rails are 32 ft. long, in mentioning which fact *Engineering* says that the London & Northwestern is using 60-ft. rails. The new Great Western rail is 92 lbs. to the yard. The old U rail was 68. The new rail is laid in cast-iron chairs weighing about 47 lbs. The work of relaying is done on Sundays, at the rate of about a mile and a half every Sunday. The ballasting is done by the Rodgers ballast car, which we have heretofore described, and which has been used considerably in this country as well as in Australia. The ballasting train of the Great Western is made up of 16 hopper cars built of ½ in. plates on channel frames. The hopper door, which is on one side, is arranged so that it may be opened 5 in., 7 in., 9 in. or 11 in., according to the amount of ballast to be discharged. These cars carry 6½ cu. yd. or about 12 tons and the cars themselves weigh each about 5½ tons. A brake van on the rear of the train is fitted with a plow for spreading the ballast. This plow can be raised or lowered by a screw motion from

the van. The train moves at about two miles an hour when discharging its load.

Damage to railroads and other property by floods has been reported within the last week or two from many places. On July 3 there were washouts in many places throughout Kansas, Indian Territory and the whole region southwest of Kansas City. From Denver it was reported that there were many breaks in the Kansas Division of the Union Pacific, including the loss of an important pile bridge. Three bridges on the Chicago, Rock Island & Pacific were carried away. On the 4th despatches from Topeka reported the loss of many highway and some railroad bridges. The Manhattan, Alma & Burlingame Railroad (an Atchison line) lost a Howe truss bridge 135 ft. long and two other large bridges. The Missouri Pacific shops at Fort Scott were submerged. On the 5th there was a flood in the region of Jefferson City, Mo., and a bridge on the Lebanon Branch of the Missouri Pacific was carried away. On the 7th a bridge of the Missouri Pacific was badly damaged near Marquette, Kan. In Chicago a signal tower was overturned by the wind. At Canton, Kan., on the 7th, there was a furious storm of rain and wind and 10 cars were blown off the track in the yard of the Atchison, Topeka & Santa Fe. At Winona, Mo., many persons were drowned.

The Chicago, Burlington & Quincy Railroad Company has ordered from the Baldwin Locomotive Works a 19-in. by 26-in. passenger locomotive of the "Columbia" type (see *Railroad Gazette*, May 26, 1893, p. 387), with some changes and improvements in design, to haul six cars from Chicago to Galesburg in three hours. The locomotive is to be single expansion, with 200 lbs. steam pressure and piston valves. The grate area is to be large and the locomotive will be a very powerful one. The distance is 163 miles and the average speed will therefore be 54.3 miles an hour. This locomotive is the outcome of the competition between the Burlington and the Northwestern in mail and fast passenger service, which has been before referred to in these columns. It will be remembered that the Chicago & Northwestern has ordered locomotives for a similar service from the Schenectady Locomotive Works, and if the apparent plans are carried out those who are interested in locomotive competitions may have a chance to learn the relative merits of one of the most improved examples of eight-wheel locomotives and one of the "Columbia" type before many months.

On June 27 the merchants of Salt Lake City and other places in Utah were cheered by the announcement that the Southern Pacific and its connections had made large reductions in the rates on freight from the Pacific coast; many commodities, especially in carload lots, were reduced in a sweeping manner, often 20, 30 and 40 per cent.; but a few days afterward the wholesale merchants and jobbers began to express dissatisfaction; and it appears that these reductions, made after the reduction of rates from the East to Salt Lake City, were to favor California as against the East, the new tariff making it possible to ship from Chicago to San Francisco and back to Salt Lake City for less than would have to be paid from Chicago to Salt Lake City direct.

NEW PUBLICATIONS.

An Experimental Study of Field Methods which will insure to Stadia Measurements Greatly Increased Accuracy. By Leonard Sewal Smith, B. C. E., Instructor in Engineering, University of Wisconsin. Bulletin of the University of Wisconsin, Engineering Series, Vol. I, No. 5; pp. 101-145. Pl. 5. Price 35 cents.

There is a widespread, although diminishing, impression among engineers that stadia work, while very pretty in theory, is too unreliable for practical use except when rough approximations will answer the purposes of the survey, and that, while the stadia is well enough for such purposes, it can never supersede the chain. To such especially this pamphlet will be a revelation of the possibilities of a method which is undeniably more rapid and less expensive and troublesome than chaining. During the progress of the International Boundary Survey between the United States and Mexico, "the whole line from El Paso to the Pacific Ocean, a distance of about 700 miles, was measured by the stadia method, and all accurate contour topography in a 2½ mile belt along nearly the whole distance was taken by the transit and stadia. The first 100 miles was also measured by chain, and longitude determinations by the U. S. Coast and Geodetic Survey, and a former triangulation, gave additional checks. It is significant that, at the end of this distance, those in charge deemed it wise to abandon the chain and to depend thereafter wholly upon the stadia measurements." This was not done because of a blind faith in stadia work, but because the admitted inaccuracies of stadia work were studied so thoroughly and successfully that systematic errors were largely eliminated by improved methods of work, and the remaining errors were made very small in absolute amount and of a non-cumulative character.

The investigations elaborated in this pamphlet were begun by the author while a transitman on this survey. The effects of time of day, temperature, proximity of line of sight to surface of ground, and length of sight were studied and the results were in many ways a surprise, even to the investigator himself. From all these results a simple explanation was found for the fact that in previous stadia surveys the errors (as determined by

checking on triangulation points) are systematically either positive or negative, depending on certain atmospheric conditions that existed at the time of the determination of the wire interval.

One of the most important features of the pamphlet is the investigation of what the author calls "differential refraction," which, briefly stated, means that rays of light from different portions of the rod will be refracted in variable amounts and the result is generally that the rod reading is less than it should be. The extent of this error and its elimination have been very thoroughly investigated.

A study of the accuracy possible in a stadia survey, properly conducted, was made by taking stadia measurements of a circuit very carefully measured previously with a steel tape, the accuracy of the tape measurements being probably as fine as 25thousandths. Precautions were taken that the observer should not know previously what rod readings he should obtain. By traversing the entire circuit thirteen times, an equivalent of eighteen miles of line was obtained. Among the many deductions that could be drawn from the results, one of the most important was that of the compensating character of the errors. While the error of one circuit, measured under the most unfavorable conditions, was as high as 360, the total uncompensated error at the end was less than 10thousandths. The eighteen miles was measured, with inexperienced rodmen, in fourteen hours.

Of course, such a degree of accuracy in stadia work requires the intelligent application of rather complex principles to the existing conditions; it requires a higher grade of observer than is strictly necessary for many other kinds of field work; but one such man, even with inexperienced rodmen, can do more and better work than with a large corps of inexperienced chainmen, and with less chance of gross error—as was demonstrated on the International Boundary Survey referred to.

Report to the Aqueduct Commissioners, by the President, James C. Duane, containing reports of the Secretary, Edward L. Allen, and of the Chief Engineer, Alphonse Fteley, and giving a Review of the Work of the Aqueduct Commission from 1887 to 1895; 11 in. x 14 in.; 104 pp., 71 folding sheets, 51 plates. New York, 1895.

This handsome and profusely illustrated volume covers the work of the Aqueduct Commission from Jan. 1, 1887, to Jan. 1, 1895, and includes plans and the work of construction of the new Croton aqueduct; proposed dams and reservoirs and appurtenances.

The President's report we reviewed at some length, Jan. 25, p. 52. It comprises a history of the works of the Commission during the years already mentioned, as well as a brief review of the works of previous years. The trouble which was experienced through defective work and the precautions taken to avoid it are again brought clearly to our attention.

The secretary presents in detail the statistics and expenditures of the commission, and a brief summary of its proceedings, during the period mentioned. This report is accompanied by schedules, maps, plans and other statistical information.

The report of the Chief Engineer is an elaborate record of the work done during the eight years covered by the report, and a general description of the work and account of the principal engineering features comprised in it. The illustrations from photographs, the detail drawings and the maps accompanying this report are very elaborate, and the description of the engineering works, their nature, capacity and cost, is detailed, making the whole report an engineering document of the first order. Engineers are already quite familiar with the magnitude of this work, the difficulties under which it has been done, and the able and unrelenting fight which has, in late years, been carried on against fraud and corruption in its prosecution. Many will remember Mr. Fteley's address on the subject at the Old Point Comfort convention of the American Society of Civil Engineers, and will recognize in this volume some of the striking photographs which he showed. The documents now brought together, with the great mass of well executed engravings make up a very complete and valuable history of this great enterprise.

American Street Railway Investments. Published annually; edition of 1895. New York: The Street Railway Publishing Co.

The second annual edition of the valuable compilation of data about street railroads, prepared by the Street Railway Publishing Co., has just appeared. It is a volume of 248 large pages, giving information of 978 operating companies, 101 leased roads and 387 new corporations located in 688 cities and towns. The scheme of the work is briefly to do for street railroads what Poor's Manual has so long and so well done for steam railroads. The plan in carrying out this work is to arrange the cities of the country alphabetically, with cross references wherever street railroad systems operate in two or more towns. Convenience of reference is served by the use of sub-headings at the tops of the pages, giving the names of towns found on those pages. There is also a general index of companies. For the larger cities, municipal statistics are given of population, area, population per square mile, assessed valuation, debt, tax rate, manufacturing interests and banking capital. The description of each property gives a short history, a statement of stock and debt, with some description of securities, a general operating report for the last three years, a description of the plant and equipment and names of officers and directors. There are 25 maps showing as many different systems. In a few cases the statistics of opera-

tion show something more than the earnings, expenses and disposition of net earnings; that is, mileage statistics and passenger traffic statistics are given. Unfortunately, however, these cases are few, for this is a class of information which is of great use not only to investors but to engineers and others who have occasion to study the problems of relative cost and efficiency of various systems, and the number of people who want that kind of information is increasing very fast.

We assume that the statistics and descriptions given are accurate within reasonable limits, and certainly there is enough information to make the book of great use to investors as well as to other inquirers.

The Official Railway List for 1895. The Railway Purchasing Agent Co., the Rookery, Chicago. Cloth, \$2. The 1895 edition of this well-known publication has recently appeared. Its character is so thoroughly well known that there is nothing left for us to say but to announce its appearance.

TRADE CATALOGUES.

Street Cars.—The Brownell Car Company of St. Louis has issued a little book under the title of "The Car Buyer's Helper," which is intended to give a sufficient knowledge of electric and cable cars to enable the purchaser to negotiate for them advantageously. The book contains 172 pages handsomely printed, well illustrated and bound in cloth. We classify this notice of it under "Trade Catalogues" because it is an advertisement of the Brownell Company, but really it is a valuable and attractively arranged treatise on the building of street cars. The details of material, framing, construction and finish are described and illustrated at considerable length. There are chapters on specifications, on inspecting and on other matters which a buyer of cars should know about, and altogether we can easily see how the book should be of real value to purchasers of such material.

Light Cars.—The Sheffield Car Company, Three Rivers, Mich., sends us a catalogue of light cars for track work and the like, which has been specially prepared for foreign countries. In fact, from the introduction we judge that it was prepared for use at the Railroad Appliances Exhibition held in London during the International Congress. The catalogue is printed in English, French, German and Spanish, and of course is designed to spread the knowledge of the wares of this company in foreign countries. The company already does a considerable foreign business, which is steadily increasing. The foreign agents are: W. A. Green, Tower Chambers, Moorgate street, London; H. Andrews, Flensburg, Germany; Bain & Hanasiewicz, Klausenburg, Austria. The cars shown and described are the well-known velocipede cars and section cars made by this company. The Sheffield steel wheel is also shown, as well as its railroad stand pipe.

Coal Handling for Steam Generation. The C. W. Hunt Company, 45 Broadway, New York. This pamphlet gives 60 illustrations taken from photographs of coal-handling plants now in operation, and is a good example of the recent advance in trade catalogues. No large power plant is complete in these days without an automatic stoker, but coal conveyors can be dispensed with where drop-bottom cars can be run above and emptied directly into the hoppers that feed the stokers. Those who are designing steam plants will be interested in this display of devices.

Discipline on Railroads.

The *Railroad Gazette* did a good thing for its readers in printing in the issue of March 15 the admirable paper on "Discipline" by Superintendent F. G. Darlington, of the Pittsburgh, Cincinnati, Chicago & St. Louis. This paper presents thoughts on the subject which have not widely taken practical form. The general notion seems to be that discipline is simply punishment for faults. This is a very limited application of a term that in its largest and true sense, must be taken to include such education and training as will lead to a minimum of occasions for the infliction of penalties; and no system can be viewed as complete that does not take this into account.

Railroad practice in the matter appears, as a rule, to rest with the idea that discipline consists in fine, suspension or discharge, for violation of rule or for other fault in the discharge of duty. Even Mr. Darlington, in his carefully prepared paper, while clearly showing the wider application of the word, falls into its use in the limited sense, showing thereby the effect of earlier mental habit.

The subject is certainly of sufficient importance to deserve a wider attention than it has received. We have books, conventions and discussions *ad lib.* relating to rules and rails, time-tables and turn-tables, cars and couplers; but what have we on the subject of training the men who are to use these things, with respect to securing, to themselves and the service, characters which shall render them as efficient as possible in their responsible duties. And where may the young superintendent find a text-book to which he may turn for an exposition of the principles underlying the most important subject claiming his attention, the training, guiding and controlling the intelligent instruments through whose agency his work is to be done.

Mr. Darlington hints at the labor of carrying out faithfully such a plan as he describes. Many no doubt will shrink from the task on account of it. But is it not worth the cost, to attach men to your service by making them feel that they are treated as men and that the object is to train them to efficiency and to give full recognition of the measure of it to which they may attain?

In the management of the inmates of our prisons the idea has been long abandoned that they are to be controlled only or chiefly by punishment. Kindness, time credit for good conduct and other methods appealing to the manhood within, have mostly superseded the government by force of former days and with the happiest effects.

Railroad officers have to deal with the same mental and moral forces, with the notable difference that the criminal tendency and habit are absent. In fact it is doubtless true that a railroad man seldom commits a serious fault or infraction of rule with deliberate intention. His interests and disposition lie in the other direction and what he needs is to be carefully instructed in his duties and to have placed before him such incentives to their faithful performance as appeal to every right-minded man. The worst and lowest of these is the fear of punishment.

It must be admitted, too, that much punishment is inflicted without the careful inquiry that assures men that justice will be done impartially, and it too often occurs that the decision is controlled by prejudice or passion.

Nothing can bind a man to the service in which he is employed more surely than to feel that his employer takes an interest in his welfare and will do the best he can for him under existing circumstances, and that he is not liable to meet with disgrace or loss of wages or position through the whim or passion of some official or for some trivial fault against which a term of faithful service counts as nothing.

It is a little difficult to give open and practical recognition to that which is most valuable in a man's career, a long period of faithful but uneventful service. The newspapers are full of accounts of crime and the misdeeds of men, but they present necessarily only notable acts of the contrary character and little or nothing comes to the public eye of the multitude of quiet, useful lives making up the mass of human existence in civilized communities.

So, men in railroad life go through their 20, 30 or 40 years, with faithful attention to the arduous daily routine, with no definite recognition of their value excepting the retention of their positions. Their pay is at rates fixed for their places; many have no opportunity to rise, and, so far as distinct expression goes, they have no knowledge of the degree of appreciation in which they are held. I am quite sure that every man, no matter what his position, prizes a word or some sign of appreciation from those by whom he is employed.

When it comes to the actual written records of the service of men, where are they? What road keeps such a record? Who can tell, excepting from the memory of fellow employees, what a man's life history has been? Who knows how many weary nights a track foreman and his gang have braved the storm to guard against threatened danger? Who recognizes, so far as he knows, the ceaseless watchfulness of the engineman through a long and anxious life, in so handling his train and "looking out ahead" as to see that no harm comes to his precious freight; and where is the record set down, excepting in the number of days for which he has been paid, and in the account of fines or suspensions for occasions when something has put him off his guard.

The debit and credit system described by Mr. Darlington has much to commend it, as he justly shows. It is certainly an improvement on the old methods in that it gives a man a complete record to which confident reference may be made. It would be well indeed if such record could be made for every man, high or low, and if matters were so arranged that each might feel that his position depended on this rather than on the uncertainties too often existing.

It has been my good fortune during 47 years of railroad life to be in the employ of those whose aim has been to treat their men with just appreciation. This has been manifested in many ways, although not by the establishment of any special system in the line now discussed. I recall the fact that the company with whom was my earliest service paid a premium of \$50 to each locomotive engineer on the completion of a year of continuous good service.

That the generous treatment referred to "paid" has been quite evident. Instances might be cited of an opposite course pursued with the result of alienation of employees, and, probably largely arising from this, unfortunate economic results.

Whether the plan tried by Mr. Darlington and perhaps others, is the best in all details will be learned by experience. That the principles on which it is based are correct there can be no question. Whether railway officers to any great extent will be impressed with their value and embody them in practical methods is yet to be seen. I am persuaded, however, that upon some such means as this must largely depend the measure of success in handling the forces which are to be recognized in the comprehensive term "labor," and in the large operations of our day it is necessary for convenient working of such measures that they be thoroughly systematized.

There can be no difficulty in accomplishing this by managers and officers who are thoroughly convinced that true, just treatment of men will bring good returns in kind, and that "with what measure ye mete it shall

be measured to you again" expresses an eternal principle applicable to all secular operations as well as to those relations in life to which are often assigned the exclusive application of scriptural precepts.

J. A. ANDERSON.

TECHNICAL.

Manufacturing and Business.

Mr. Charles E. Billin has recently been appointed western Agent of Bement, Miles & Co., of Philadelphia, manufacturers of high class machinery and tools, his office being at 1334 Marquette Building, Chicago.

A company called the United States Nut Lock Co., of Pittsburgh, secured a charter at Harrisburg, Pa., last week, the capital stock of the new company being placed at \$5,000.

Tae Boies Steel Car Wheel Works, at Scranton, Pa., has advanced the wages of its 200 employees 10 per cent., to go into effect from July 1. The works are crowded with orders.

Iron and Steel.

The Maryland Steel Works, at Sparrows Point, Md., will resume operations in all departments of the plant in a few weeks. Some departments have been in operation since the reorganization of the company and about 600 men are now employed. When the rail mill and other departments resume nearly 1,200 men will be employed. The company has restored the 10 per cent. reduction made a year ago.

The following officers have been chosen for the reorganized Pennsylvania and Maryland Steel Companies: President, Effingham B. Morris; Directors, Luther S. Bent, N. Parker Shortridge, George Philler, Alfred Earnshaw, John B. Gest and Howland Davis; Executive Committee, Major L. S. Bent, Chairman; George Philler and Alfred Earnshaw. These officers have been selected by the Reorganization Committee, to serve until the annual meeting of the stockholders.

New Stations and Shops.

The Merchants' Despatch Transportation Co. is reported to have finally decided to build extensive shops at Depew, N. Y., and to remove to that point the present shops at Rochester, N. Y. It is said that the new plant at Depew will be ready for operation within four months and that the company will then be prepared to build its own cars, as well as do general repair work.

The Union Car Co., is making extensive additions to its main building at Depew, N. Y., and will at once put up an extension of about 800 ft.

The contract for building the new roundhouse, oil house, freighthouse and machine shops for the Baltimore & Ohio Railroad Company, at Cumberland, Md., was last week awarded to J. J. Walsh & Son, of Baltimore.

Marine Construction.

Preliminary returns to the Bureau of Navigation show that 682 steam and sail vessels of 132,719 gross tons were built and documented in the United States during the past fiscal year, compared with 776 steam and sail vessels of 121,547 tons during 1894, an increase of 11,000 tons. Final and revised returns will somewhat increase the figures by the addition of barges, etc. Steam vessels numbered 283, of 75,728 gross tons; sail vessels, 399, of 56,990 tons; a decrease of 8,000 tons steam and an increase of 19,000 tons sail, compared with 1894.

Construction on the Atlantic and Gulf Coast comprised 442 vessels, of 79,520 tons, compared with 562 vessels of 66,478 tons for 1894. Construction on the great lakes comprised 93 vessels of 38,016 tons compared with 89 vessels of 40,372 tons. Among notable additions of the year to the merchant fleet are the steamers St. Louis Northland and Newport News.

Steel construction comprised 36 vessels, of 47,696 tons, compared with 35 vessels of 50,736 tons in 1894.

The number of American vessels thus far officially reported as lost during the year comprised 85 steam vessels and 276 sailing vessels, barges, etc.

The Jerome Park Reservoir, New York.

This reservoir, described in the report of the New York Aqueduct Commission, is to be built at Jerome Park, in the 24th Ward, New York City, this being the only available spot for a reservoir in the district north of the Harlem River. The present distributing reservoir, that at Central Park, has a capacity of 1,000,000,000 gals., being only five days' supply for the city, and this fact has made the new reservoir a necessity. It will be built to hold at high water mark 1,500,000,000 gals., corresponding to 7½ days' supply at the time of its completion. The work will include the building of an additional mile of aqueduct, and the combined excavation for this and for the reservoir will be about 7,000,000 cu. yds. To give an idea of the magnitude of the work, this amount of earth would cover one square mile to a depth of nearly 6.8 ft. Specifications for the work have been issued, and bids received. The contracts will not be canvassed by the Commissioners before July 17.

Car Lighting.

Papers have been filed in the United States Circuit Court for the District of New York, in an action by the Safety Car Heating & Lighting Company against the firm of John Williams. This is for alleged infringement in the manufacture of the lamp sold to railroad companies known as the "Gordon & Mitchell" lamp. The action was brought by the attorney of the company,

Randolph Parmly, of New York City, and the company has associated Messrs. Frederick H. Betts and Elihu Root as counsel.

Power Station for Lenox Avenue Conduit Road.

We described last week the conduit electric road recently put in service on Lenox avenue, New York City. A car barn at the corner of 146th street and Lenox avenue now provides a storage capacity for about 20 cars. The tracks are provided with pits for the examination of trolleys and motors.

If the system proves successful, the power will probably be increased by the addition of three direct connected units of 1,500 H. P. each, making the total capacity of the station 5,000 H. P., and the present temporary power house will be replaced by a handsome brick building, 550 ft. x 200 ft. on Lenox avenue. It will be two stories in height, with steel skeleton inclosing brick walls and will be fireproof. The car house will have a capacity of about 350 cars. Ample provision has been made on the ground floor for repair shops and rooms for the engineers and firemen. The superintendent's office and a large reading room for the employees will be arranged on the second floor. In the tower on the third floor accommodations will be provided for the electricians of the station. The offices of the receivers and starters, as well as the waiting-room for conductors and motormen, will be located at the corner of 146th street.

THE SCRAP HEAP.

Notes.

The Atchison, Topeka & Santa Fe has increased the force of men at all its car shops in Kansas.

The ticket agents of the Brooklyn Elevated Railroad are now required to give bonds of \$300 each. The company pays the premiums.

The District Attorney at San Francisco has withdrawn all the suits against the railroad strikers and rioters of 1894 that were pending in the United States District Court for California. Over 100 men are let off.

Matters in the mining district of West Virginia are still unsettled and the Governor of the State was called upon for troops this week. The Norfolk & Western Railroad has United States marshals on guard at many places.

Judge Woods, of Chicago, has decided that Debs' two terms of six months each in jail may be served simultaneously, so that he will be out in three or four months. The other prisoners will have to serve only about half as long as Debs.

At Bristol, Ind., on July 4, the sidewalk of a bridge over the St. Joseph River gave way under a load of about 300 persons who were watching a boat race, and about 100 fell into the river. About 50 were injured, some of them fatally.

On the Choctaw Railroad, a new line in Oklahoma Territory, some of the bridges have been blown up by dynamite. This vandalism is due, it is said, to the rivalry between different towns which desire to have the road built through their territory.

Train No. 2 of the Pittsburgh, Cincinnati, Chicago & St. Louis now runs from Seymour, Ind., to Jeffersonville, 49 miles, in one hour. Train No. 5, in the opposite direction, traverses the same distance in 64 minutes.

The United States Grand Jury, at New Orleans, has indicted the President and other officers of the Cotton Screwmen's Association (21 men in all) for interfering with interstate commerce by force of arms during the labor disturbances on the levee last spring. Indictments were also found against eight leading members of the Longshoremen's Union.

In Chicago on July 4 a gang of rowdies attacked an excursion train of the Atchison, Topeka & Santa Fe Railroad near Sixteenth street and a fight ensued in which pistols were used freely. The conductor was shot and wounded. On the Canadian Pacific near Montreal July 6 a drunken mob took possession of a passenger train and terrorized all on board for a long time.

The Union Pacific has notified the employees of the shops at Cheyenne that if they will accept the rate of wages paid at Denver the shops will be continued open and probably more men will be put to work. This means a reduction of 25 cents a day in the pay of machinists, but the other classes already receive the same wages as those paid at Denver.

A passenger train of the Southern Pacific was stopped by robbers near Riddle's Station, Or., on the night of July 1 and the valuables of the passengers taken. The engine was disabled by a stick of dynamite exploded under the forward truck. On the afternoon of the 1st an inspection train of the Philadelphia & Reading was attacked by a gang of toughs at a water tank near Reading, but they were repulsed.

A buffet car on a street railroad is the latest novelty, and it makes its first appearance in Philadelphia. According to the New York *Herald*, the electric street car lines of that city have for a long time indulged in feverish competition for the patronage of pleasure parties; and this car fitted up with conveniences for serving ice cream has just been put on. Several of the companies have special decorated cars for pleasure parties. One of these cars has 265 colored electric lights on its sides and roof.

The Aransas Pass Improvements.

The Aransas Pass Harbor Co., of Aransas Pass, Tex., has concluded negotiations with Alexander Brown &

Sons for a \$300,000 loan with which to build a break-water and establish a permanent depth of 20 ft. of water over the bar at the Texas port. The estimated cost of the improvements contemplated at Aransas Pass will amount to several millions of dollars.

A Kentucky Decision Forbidding Consolidation of Competing Railroads.

About two years ago the Commonwealth of Kentucky brought suit against the Louisville & Nashville, the Chesapeake, Ohio & Southwestern, the Ohio Valley, the Owensboro, Falls of Rough & Green River, the Short Route Railway Transfer Co., and the Paducah Union Depot Co., seeking to enjoin the Louisville & Nashville from acquiring possession of the properties of either of the other defendants, or of the Hodgenville Railroad Co. or of the Union depot at Seventh and Water streets, in Louisville. The reason given for the action was that the roads of the other defendants were parallel and competing to that of the Louisville & Nashville, and their acquisition by the latter would be in violation of the Constitution of the State, Section 201, which forbids the union of parallel or competing lines. The injunction was granted by the Chancery Division of the Jefferson Circuit Court, and appeal taken by the railroad to the Court of Appeals. Decision has been recently handed down affirming the action of the lower court. After reviewing the immediate causes leading up to the suit, the judge says:

If that purchase is made the Louisville & Nashville will own and operate without competition every road, with one exception, within that part of this State, bounded by the Ohio River, its own main line, the Tennessee line, and that portion of the Chesapeake, Ohio & Southwestern main line, extending from Paducah southward, including the entire western coal fields. The exception referred to is the Louisville, St. Louis & Texas, which, if the alleged scheme is carried out, will probably also become part of the Louisville & Nashville.

The effect of the acquisition by the Louisville & Nashville of these roads will be absorption of an entire system of parallel and competing lines about 400 miles in length, and the substitution of a monopoly of railroad transportation. Section 201, in plain terms, makes it unlawful for any two or more railroad companies owning parallel or competing lines or structures to consolidate their capital stock, franchise or property or to pool their earnings in whole or in part; or for one of them to acquire by purchase or lease the property or franchise of the other, the manifest purpose being to foster competition and effectually forestall monopoly. The framers of the Constitution made that inhibition applicable, not merely to the case of competing, but as well to that of parallel lines, which, though not always competing lines might become so by construction of a branch. Obviously the word "parallel" was not used according to its strictly accurate meaning of two railroads constructed equidistant apart throughout their whole extent.

This law is not a regulation of interstate commerce. Its enforcement does not infringe upon the power of Congress to regulate commerce between the states.

Rear Collision at Craig's Road, Que.

A very bad rear collision of passenger trains occurred last Tuesday morning about 3 o'clock on the Grand Trunk at Craig's Road, Que., 15 miles southwest of Quebec, on the south side of the St. Lawrence River, in which 13 or more persons were killed and over 50 injured. Both trains carried excursions which left Richmond, Que., the night before and were loaded with religious pilgrims bound for the shrine of St. Anne de Beaupre. The foremost train had stopped to take water, and, according to the reports, there was a semaphore signal for the protection of trains standing at the station, which was duly placed in the danger position. The second train came on, however, at high speed, and it is assumed that the engineer was asleep, though this point may never be cleared up as both the engineer and fireman were killed. The rear car of the foremost train was a sleeper and in this the greatest havoc was wrought. The engine plowed right through it. Several of the passengers in this car were priests. Some of the passengers were undoubtedly killed instantly without being awakened. This is the first train accident in this country or Canada, killing more than 10 passengers, since January, 1894, the only accidents in the last 18 months comparable with this being those at Hackensack, N. J., Jan. 15, 1894, killing 13 passengers, and at Lincoln, Neb., in August, killing 8.

Street Railroad Projects.

The Albany & Suburban Railway was incorporated at Albany last week to construct an electric road about twelve miles in length to connect Greenbush, Castleton, and Bath-on-the-Hudson with Albany. The capital is \$200,000, and the Directors are F. H. Barnes, John S. Burke, George T. Cunningham, of Ballston; George D. Moore, of Worcester, Mass.; Arthur Hilton, of Boston; John Leggett, Joseph A. Leggett and Albert J. Barnes, of Troy, and Charles A. Goddard, of Lowell, Mass. It is proposed to carry light freight.

Savannah's Deep-Water Channel.

Savannah newspapers announce that vessels drawing 24 ft. of water are now loading at the wharves of that city, a depth of 26 ft. mean high water having been secured by the recent dredging of the channel of Savannah River. The channel is said to be about 200 ft. wide in the narrowest part, and the work still remaining to be done is to give it more width in certain places. While a width of 200 ft. is sufficient to accommodate any vessel, it is desired to give ample room, and for this reason the width in some places will be considerably increased.

Lake Superior Mining Interest.

The mining regions in Minnesota will reap little benefit this season from the higher prices for iron and steel products, except in the increased demand that will allow hitherto neglected ores to be put on the market at reasonable prices. The bulk of the possible Bessemer output of the year was sold at old prices before the advance was felt.

Following the rise in finished forms of iron and steel ore is booked for an advance. Indeed, it is impossible to buy ore at this date at old prices, and it is hard to get it at all. Non-Bessemer, with which the market has been heavily stocked for the last two years, have gone from \$2 to \$2.25. The reports are that Bessemer have been held for an advance of 50 cents and it is likely that they will score more than this.

Mines in the Lake Superior region are working under heavy pressure and the movement to July 1, while not yet figured out, is known to be the heaviest on record. Ore that in the early months of the year found no sale is now sought for by buyers and in the last week five mines in the Mesabi district alone have started up, or made arrangements to work as soon as possible. All the mines in the Gogebic and Menominee ranges that can work are busy or are being pumped out preparatory to starting.

The price of coke will go to \$1.50 in a few weeks and lake freights on ore, which are strong at 95 cents from

the head of the lakes, will undoubtedly go to \$1 in a very short time. They have not reached this figure, except in cases valueless for comparison, in three years. It is entirely likely that the shipments of ore from the Lake Superior region for the season will exceed 10,000,000 tons, and they certainly will if there can be found vessel capacity to take care of this enormous total. Within two weeks iron ore authorities have predicted that total shipments would not exceed 8,000,000 tons, and the entire iron trade has been as badly at fault all the season in estimating the future.

The total shipments of ore from upper Lake Superior to July 1, were 825,000 gross tons from Ashland, 621,000 from Two Harbors, and 407,000 from Duluth. In each case all preceding records from the shipping ports are surpassed. It is now possible to give in practical detail, shipments for the year from the Lake Superior country. The Gogebic will mine 2,400,000 tons, the Mesabi 3,400,000, the Vermilion 1,100,000, the Marquette and Menominee about 3,000,000, so that the total for the year will be nearly 1,000,000 tons greater than in any preceding season. The vessel rate has fallen a trifle, but will go higher soon. On Friday last 13,700 tons were shipped over the Duluth docks of the Duluth, Missabe & Northern road, the best work on record.

Lake Notes.

About 4,000,000 bushels of wheat are to be carried out of the head of Lake Superior in July, of which 120,000 went forward last week. It is expected that not less than 20,000,000 bushels will be handled by lake this fall on the crop soon to be harvested.

Less than 100,000 tons of coal have been received on Lake Superior this year, the smallest total to a corresponding date for years. Receipts for later months will be very large.

The first of the small steamers which will be used by the Cleveland Steam Canalboat Company for freight traffic between Cleveland and New York by way of Lake Erie, the Erie Canal and the Hudson River, was launched at Cleveland July 6.

Charging What the Traffic Will Bear.

Mr. J. Wilder, now 82 years old, writes to the Burlington (Vt.) *Free Press*, showing how the lumber business was started in Burlington 45 years ago. He had supervision of the construction of the Central Vermont Railroad, and took charge of the operating department at each station as the track was completed. When the road reached Burlington a Canadian barge had just left with a hardware house on the wharf a lot of Canadian pine suitable for sash, doors and blinds. Deacon Chase, of Nashua, N. H., was there to buy flour and nails, and the lumber was offered to him, but he declined to buy, saying the freight would eat it up, judging from the charges on Maine lumber from Boston. But the parties went to see Wilder, and he says the thought flashed through his mind that if the road could get a lumber trade started from Canada it would grow into a large and permanent business; and he told the deacon he would take the lumber for just what he was pleased to pay. A rate of \$4 per M. was agreed upon, and the lumber shipped. Soon after, Lawrence Burles, who became one of the heaviest manufacturers and shippers of Canada pine in New England, came to Wilder, and said that if he could have the same rate he would go to Canada and buy largely for the Boston trade. Mr. Wilder agreed to ship all that was furnished to Boston, Lowell, Manchester and Lawrence for \$4 per 1,000. That tariff continued up to war times, when it was slightly advanced, but has since been reduced to the old rates. The first shipment led to Burlington's becoming the third lumber market in the United States. Mr. Wilder had no printed tariff, but made rates as he went along from station to station, such as in his judgment, would develop business on the line. . . . By a fortunate exercise of good judgment at the right moment, the lumber trade started with the opening of the railroad and has been a large factor in its business to this day.

Mr. Wilder now lives in Bristol, Tenn., and we find this sketch in the *Iacoma* (Wash.) *Ledger*.

RAILROAD LAW—NOTES OF DECISIONS.

Carriage of Goods and Injuries to Property.

In Minnesota the Supreme Court holds that a stipulation in a bill of lading exempting the receiving carrier from its common law liability for the loss of the goods while in its warehouse at the end of its line, and before delivery to the connecting carrier, is void, unless there is a special consideration for such exemption other than the mere receipt of the goods and the undertaking to carry them.

The Supreme Court of Texas rules that where connecting carriers are partners in the transportation of freight, the initial carrier cannot, by contract, limit its liability for injuries to through freight to such injuries only as occur on its line.

In the Federal Court it is held that an accident to a train through negligence does not excuse non-compliance with the statute forbidding interstate carriers of animals to confine them more than 28 consecutive hours without unloading for rest, water and feeding, unless prevented "by storm or other accidental causes."

In Texas it is laid down that a clause in a contract by a railroad to ship cattle, providing that no action for delay in transportation shall lie unless commenced and citation served within 40 days, is against public policy and void.

In Minnesota the Supreme Court rules that the establishment by two or more common carriers of joint or through tariffs of rates does not make them joint carriers, or one of them liable for the default of another.

In Texas it is ruled that the owner of wood destroyed by fire communicated from the tracks of a railroad was not guilty of contributory negligence in piling the wood intended for shipment close to the track, which was covered with combustible matter, when he piled it in the place designated by the railroad for piling wood intended for shipment, and no shipment could be made from any other place.

In Maine it is held by the Supreme Court that the fact that a building extends a few feet into the location of a railroad, if placed there or permitted to remain by license of the railroad company, will not exempt the company from liability for injuries to the building or its contents by fires communicated by its locomotive engines.

In Nebraska, in an action against a railroad for killing a horse, there was evidence that the horse went upon the track just before a train passed, and that the horse was afterwards found near a trestle. There were marks on the trestle indicating that the horse had been upon it, and the injuries of the horse were such as might have resulted from its being struck by a locomotive. This the Supreme Court says is sufficient to support a finding that the horse was killed by defendant.

Injuries to Passengers, Employees and Strangers.

In the Federal Court the plaintiffs, having tickets for passage over a railroad, purchased from a palace car company a ticket for the drawing-room of one of its cars, part of a train going to their destination. Before arriving there the train was turned back by the railroad officials because of a washout on the road, and plaintiffs were ejected from the car by order of the conductor. By contract between the palace-car company and the railroad company, the drawing-room car was operated and controlled by the railroad company. The court rules that plaintiffs could not recover damages from the palace-car company as for breach of a contract, that company not being a common carrier, and having made no contract to carry; its obligation being only to accommodate them with the drawing-room in its car so long as the carrier would convey it.¹

In Texas, the Supreme Court says that where a passenger on a train, who has been carried beyond his place of destination by reason of his being asleep, unknown to the carrier, when notice of the place was given and the train stopped, is injured by his jumping from the train while it is in motion, being advised by a brakeman that it was not dangerous to do so, the carrier is not liable, as the giving of such advice is not a duty delegated to brakemen.¹⁰

In South Dakota it is held that a special contract for transporting live stock and emigrant movables, made between a railroad company and a shipper, that the shipper may pass upon the same train to care for his stock, and load and unload the same at his "own risk of personal injury, from whatever cause," is a valid contract, and exonerates the carrier from all liability for any injury to the shipper while a passenger upon such train, not caused by the gross negligence, fraud or willful wrong of the company or its servants.¹¹

A Michigan statute requires railroads to block their switches. By the method used by defendant, the flanges of the car wheels, in a few days, would wear the blocking so that it would be 2 in. below the rail. There were other plans of blocking in common use, which prevented the wheels from wearing down the blocking. The Supreme Court says that the blocking used was not a compliance with the statute, and rendered defendant liable to an employee who was injured by having his foot caught in the switch by reason of the defective blocking.¹²

In Indiana it appeared that an engineer in charge of locomotive No. 172 was ordered to slide track, and wait until locomotive No. 167, in charge of plaintiff, had passed; that on reaching the station, and waiting a few minutes, No. 172 started ahead, and, on seeing No. 167 coming, stopped; that the headlight of No. 172 was defective, and could not be used, but that hand lights which were for use in case of emergency, and which would throw a light five miles, were on board, but were not used; that plaintiff did not see No. 172 in time to stop his engine, and ran into it, and was injured. The Supreme Court holds that the negligence of the engineer in charge of No. 172 was the proximate cause of the accident, and not the failure of the company to provide a proper headlight.¹³

In New York, plaintiff, who had been employed as brakeman by defendant for several months, was placed on a car in order to give the necessary signals to the engineer of the train which was being loaded with crushed stone. The dust from the crusher interfered with his view of the engineer, and he got down from the car, and stood on the main track. After standing there about five minutes, he was struck by a passing engine. There was nothing to interfere with his observation in each direction. The Supreme Court rules that he was guilty of contributory negligence.¹⁴

In the Federal Court the failure of a railroad to securely fasten the ends of a car which are on hinges, so as to allow the car to be used as a flat car by dropping the ends inward, is not negligence, so as to render the company liable to a brakeman who, in getting off the car, is thrown beneath the wheels by the end falling in, he having used it as a support.¹⁵

The Supreme Court of Illinois holds that a city ordinance forbidding railroads from running any passenger train or cars or any freight train or car through the city at a greater rate of speed than that named in the ordinance applies to locomotives running without cars attached.¹⁶

In Indiana a railroad is liable for injuries to one who comes to the depot to meet friends caused by failure to keep the station platform in a reasonably safe condition and reasonably well lighted.¹⁷

In Alabama one who is wrongfully ejected from a train has no right to travel on the railroad tracks if there is any other safe and convenient route.¹⁸

- ¹ *Wehman v. M. St. P. & S. S. M.*, 59 N. W. Rep., 546.
- ² *G. C. & S. F. v. Wilbanks*, 27 S. W. Rep., 302.
- ³ *N. N. & M. V. v. U. S.*, 61 F. d. Rep., 483.
- ⁴ *G. C. & S. F. v. Hume*, 27 S. W. Rep., 110.
- ⁵ *Wehman v. M. St. P. & S. S. M.*, 59 N. W. Rep., 516.
- ⁶ *T. & P. v. Ross*, 27 S. W. Rep., 728.
- ⁷ *Sherman v. M. C.*, 30 At. Rep., 69.
- ⁸ *C. B. & Q. v. Hildebrand*, 60 N. W. Rep., 335.
- ⁹ *Duval v. Pullman Palace Car Co.*, 62 Fed. Rep., 265.
- ¹⁰ *M. K. & T. v. Perry*, 27 S. W. Rep., 496.
- ¹¹ *Meuer v. C. & V. St. P.*, 59 N. W. Rep., 945.
- ¹² *Eastman v. L. S. & M. S. N. W. Rep.*, 309.
- ¹³ *N. Y. C. & St. L. v. Perigee*, 37 N. E. Rep., 976.
- ¹⁴ *Clark v. N. Y. L. E. & W.*, 30 N. Y. S., 126.
- ¹⁵ *Grabam v. C. St. P. & O. R.*, 37 N. E. Rep., 896.
- ¹⁶ *East St. L. C. Ry. v. O'Hara*, 37 N. E. Rep., 917.
- ¹⁷ *N. Y. C. & St. L. v. Mushu-b*, 37 N. E. Rep., 954.
- ¹⁸ *Verner v. Ala. G. S.*, 15 South Rep., 872.

LOCOMOTIVE BUILDING.

The Davenport, Clinton & Eastern, a new Iowa railroad, will soon be in the market for four locomotives.

The Baldwin Locomotive Works have an order for three standard gage engines for the York Southern Railroad in Pennsylvania, one being a freight engine and the other two passenger.

The Altoona shops of the Pennsylvania are reported to be unusually busy in building new locomotives and also on rebuilding work. Within a few days five class P engines, to be used on the heavy trains on the New York Division, between Jersey City and Philadelphia, have been turned out. A number of old-style class P engines and class R freight engines are undergoing extensive repairs. The Harrisburg shops are also doing a good deal of work in repairing and rebuilding engines. The Altoona shops have ahead of them orders for a number of heavy fast freight engines for the Panhandle and Fort Wayne roads.

The Brooks Locomotive Works at present has a considerable number of orders, including heavy freight locomotives for the Mexican Central and an order from the Great Northern for five heavy freight engines. The latter order is in addition to the 10 locomotives ordered by the Great Northern sometime ago. These engines are now about completed after some delays in their erec-

tion. Recent small orders of the Brooks Works include a 17 in. x 24 in. six-wheel switching engine for the Johnson Steel Co., of Cleveland, this engine having been in stock. A special switching locomotive for Corrigan & McKenny, of Cleveland, designed for service at their iron furnaces, is now being built at Dunkirk.

CAR BUILDING.

The Beech Creek road is in the market for 1,000 cars. The order will be given out this week. The cars will be hopper bottom gondolas and will have Westinghouse brakes.

The Wisconsin & Michigan Railroad Co. has just placed an order with the United States Car Co., for 250 box cars, of 60,000 lbs. capacity and 34 ft. long. An order for an additional 250 cars will be ordered shortly.

The Southern Pacific has now received the first 400 of the 700 ventilated fruit cars ordered from the Ensign Manufacturing Co., early this year. The balance of the order will probably arrive at San Francisco during the month. These cars are to be used in carrying fruit from California points to Chicago, on special trains, making fast time.

The equipment of the Davenport, Clinton & Eastern Railroad will include four first-class passenger cars, 20 box cars, 20 platform or coal cars, two combination cars and two cabooses. The contracts for most of this equipment will probably be given out within a few months. The road is just about being put under contract.

The Philadelphia Traction Co. is building a number of mail cars designed in accordance with the suggestions of the United States Post Office authorities. The People's Traction Co., the second large street railroad in Philadelphia, already operates a number of mail cars on its lines, but the cars to be put on the Philadelphia Traction Company's lines will differ considerably in design from those cars, resembling more closely the design adopted for the mail cars to be run on the Brooklyn electric street railroads. One half of each of the new cars will be used for assorting the mail, accommodation being provided in the other half for passengers.

BRIDGE BUILDING.

Appleton, Wis.—The Valley Terminal Railroad will build an important iron bridge over the Fox River at Appleton, Wis., on its new road, which is about to be put under contract. Other iron bridges and several trestles will also be built on the new road, and the contracts for this work will probably be given out within a few weeks. D. C. Dunlap, of Chicago, is Chief Engineer of the railroad company.

Galveston, Tex.—The Missouri Valley Bridge Co. has the contract for building the new bridge over West Bay for the Gulf, Colorado & Santa Fe. The cost of this bridge will be about \$89,000.

Hempstead, Tex.—The Commissioners Court received bids from ten companies for the iron bridge across the Brazos River. The bids were: Chicago Bridge Co., Plan 1, \$17,910; Plan 2, \$16,995; New Columbus Co., \$18,800 and \$17,000; King Bridge Co., \$22,470 and \$18,774; Missouri Valley Co., \$19,995 and \$18,200; Penn. Bridge Co., \$19,800 and \$17,950; Wrought Iron Co., \$24,323 and \$22,230; Milwaukee Bridge Co., \$18,583 and \$16,383; Groton Bridge Co., \$19,997 and \$17,477; Southwestern Bridge Co., \$18,695 and \$15,050; G. E. King Company, \$23,960.

The Court decided to have the bridge built on Plan 1, and the Chicago Bridge Company, being lowest bidder, was awarded the contract.

Houston, Tex.—The City Engineer has completed plans and specifications for the proposed bridge across the bayou at Hill street, connecting the Second and Fifth Wards. If approved by the City Council, the plans will be forwarded to the Secretary of War.

London, Ont.—Six tenders were received for the construction of two steel bridges over Kettle Creek and Mill Creek for the London & Port Stanley Railroad, the tender of the Hamilton Bridge Works, at \$38,241, being the lowest, but owing to their tender not being in accordance with specifications, the engineers recommended the acceptance of the tender of the Dominion Bridge Co., of Montreal, at \$39,660, to whom the contract has been awarded.

Petersburg, Va.—The Richmond & Petersburg is building a heavy iron bridge across Fallen Creek, near Petersburg.

Rock Island, Ill.—The specifications for the Rock Island Bridge, to be constructed over the Mississippi River between Rock Island, Ill., and Davenport, Iowa, have been made public. The superstructure will consist of one draw span 365 ft. 7 in. long, between centers of end pins; two fixed spans 258 ft. long; three fixed spans 216 ft. 6 in. long; one fixed span 193 ft. 3 in. long; and one fixed span 98 ft. 9 in. long. The material for the draw span is to be complete for shipment by Dec., 1895, and to be erected by Jan., 1896. The material for the other parts are to be ready for shipment by Oct., 1896, and all are to be erected by Nov., 1896.

St. Anne de la Perade, Que.—The contracts for the erection of a steel bridge here were awarded as follows: Masonry, George Beaucage; steel work, Imperial Bridge Co., both of Montreal.

St. John, N. B.—Contracts for steel bridges over Salmon and Tuskett Rivers have been awarded to the Central Bridge & Engineering Co., of Peterboro, Ont.

MEETINGS AND ANNOUNCEMENTS.**Dividends.**

Dividends on the capital stocks of railroad companies have been declared as follows:

- Annapolis, Washington & Baltimore*, 2 per cent., payable July 1.
- Atlanta & West Point*, 3 per cent., payable July 6.
- Augusta & Savannah*, 3 per cent., payable July 1.
- Boston & Providence*, quarterly, 2½ per cent., payable July 1.
- Burlington, Cedar Rapids and Northern*, semi-annual, 1½ per cent., payable Aug. 1.
- Central of New Jersey*, 1½ per cent., payable Aug. 1.
- Cumberland Valley*, quarterly, 2 per cent., payable July 1.
- Mine Hill & Schuylkill Haven*, \$2 per share, payable July 15.
- Old Colony*, quarterly, 1½ per cent., payable July 1.
- Pittsfield & North Adams*, 2½ per cent., payable July 1.
- Portland & Rochester*, 3 per cent., payable July 15.
- Ware River*, 3½ per cent., payable July 1.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

- Marquette, Houghton & Ontonagon*, annual, 301 Nester Block, Marquette, Mich., July 18.
- Negaunee & Palmer*, annual, 301 Nester Block, Marquette, Mich., July 18.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The Engineers' and Architects' Association of Southern California meets each third Wednesday of the month in the Hall of the Chamber of Commerce, Los Angeles, Cal.

The Engineers' Society of Western New York holds regular meetings the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

The Western Railway Club meets in Chicago on the third Tuesday of each month, at 2 p. m.

The New York Railroad Club meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The New England Railroad Club meets at Westeyan Hall, Bromfield street, Boston, Mass., on the second Wednesday of each month.

The Central Railway Club meets at the Hotel Truxton, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

The Southern and Southwestern Railway Club meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The Northwestern Railroad Club meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The Northwestern Track and Bridge Association meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The American Society of Civil Engineers meets at the House of the Society, 127 East Twenty-third street New York, on the first and third Wednesdays in each month, at 8 p. m.

The Western Society of Engineers meets on the first Tuesday in each month, at 8 p. m. The headquarters of the society are at 1736-1739 Monadnock Block, Chicago. The business meetings are held on the first Wednesday at its rooms. The meetings for the reading and discussion of papers are held on the third Wednesday at the Armour Institute, Thirty-third street and Armour avenue.

The Engineers' Club of Philadelphia meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The Boston Society of Civil Engineers meets at Westeyan Hall, 36 Bromfield street, Boston, on the third Wednesday in each month, at 7.30 p. m.

The Engineers' Club of St. Louis meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The Engineering Association of the South meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The Engineers' Society of Western Pennsylvania meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7.30 p. m.

The Technical Society of the Pacific Coast meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The Association of Engineers of Virginia holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The Denver Society of Civil Engineers meets at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December, when they are held on the second Tuesday only.

The Montana Society of Civil Engineers meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The Engineers' Club of Minneapolis meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The Canadian Society of Civil Engineers meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The Civil Engineers' Club of Cleveland meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The Engineers' Club of Cincinnati meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month, at 7.30 p. m. Address P. O. Box 333.

The Engineers' and Architects' Club of Louisville meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday each month at 8 p. m.

The Western Foundrymen's Association meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. B. W. Gardner, Monadnock Block, Chicago, is secretary of the association.

The Association of Civil Engineers of Cornell University meets on Friday of each week at 2.30 p. m., from October to May, inclusive, at its association rooms in Lincoln Hall, Ithaca, N. Y.

Western Foundrymen's Association.

The next meeting of the Western Foundrymen's Association will take place at the Great Northern Hotel, Chicago, at 7.30 p. m., Wednesday, July 17. A paper will be read by Mr. H. S. Vrooman, of Chicago, Ill., entitled "The Future of the Association." It is earnestly desired that all members of the Association be present at this meeting, and to non-members who are interested in the Association a cordial invitation is extended to be present and take part in the discussions.

Central Association of Car Service Officers.

An organization under this name has been formed in Chicago to include in its membership the representatives of all railroads and private car lines operating within the boundaries of Central Standard time. The object is to bring all men in charge of car service matters, by whatever title they may be called, together quarterly for exchange of views and comparison of methods. The officers elected at the initial meeting are as follows:

President, J. J. Hall, Northern Pacific; Vice-President, S. T. Cammack, Iowa Central; Secretary, Thos. R. Limer, C. H. V. & T. Columbus, O.; Treasurer, W. R. Bradley, C. & St. L. Springfield, Ill. Executive Committee: W. A. Vaughan, Southern Ry.; J. L. Brass, Chicago Great Western; F. C. Vogel, Chicago & Grand Trunk.

PERSONAL.

—Mr. M. McNally, Assistant Master Mechanic of the Manhattan Railway, has been appointed to the position of Master Mechanic, vice Mr. T. W. Peeples, resigned.

—Mr. D. H. Snyder, of Georgetown, Tex., has been elected President pro tem. of the Trinity, Cameron & Western road, a new line in Texas, vice Emzy Taylor, deceased.

—Mr. Frank S. Jones, Superintendent of the Jamestown & Lake Erie Railroad, in New York, resigned his position last week and so far no successor has been appointed.

—Mr. J. A. Rasback, for the past six months Superintendent and Trainmaster of the Cheyenne and Northern division of the Union Pacific, Denver & Gulf, has resigned that office.

—Mr. S. A. McNeilly, General Superintendent of the Gulf, Beaumont & Kansas City road, has resigned, to take effect on July 15. This is a road which has been building in Eastern Texas for the last two years and is now in operation for 60 miles.

—Mr. E. T. Haines, Vice-President of the Jamestown & Lake Erie Railroad, which is a reorganization of the Chautauqua Lake road, is now acting as General Manager, assuming the duties formerly performed by Mr. W. E. Griggs, who has just resigned.

—Mr. J. S. Wilbur, of Stockton, has recently been appointed Superintendent of Construction of the San Francisco & San Joaquin Valley Railroad, which is now being surveyed south of Stockton, and is likely to be put under contract within a few weeks.

—Mr. C. Stuart Patterson has been elected a member of the Board of Directors of the Pennsylvania to fill the vacancy occasioned by the death of H. H. Houston. The new director is dean of the Pennsylvania Law School, and is one of the best-known lawyers in Philadelphia.

—Mr. T. H. Fitzpatrick, formerly with the Kansas City, Fort Scott & Memphis road, has been appointed Superintendent of the Cheyenne & Northern branch of the Union Pacific, Denver & Gulf, to succeed Mr. J. A. Hasbach, resigned, with headquarters at Cheyenne, Wyo.

—Mr. J. B. Weaver has been recently appointed Treasurer of the Chesapeake, Ohio & Southwestern. This is a new office, Mr. Weaver having been formerly cashier of the receivers. That position was abolished on July 1 and Mr. Weaver promoted to the office of Treasurer of the Receivers.

—Mr. Grant Wilkins has been reinstated as Chief Constructor of the Atlanta Cotton States & International Exposition. Mr. Wilkins resigned connection with the Exposition Company on account of a disagreement with the officers of the Exposition in regard to the manner of an award of a certain contract.

—Mr. T. G. Bush, of Anniston, Ala., who has been Receiver of the Mobile & Birmingham for several years past, has been elected President of the reorganized company. Mr. J. D. Clark, who was Superintendent and Purchasing Agent for the receiver, will hold a similar position with the new company.

—Mr. F. S. Hammond, General Manager of the Kansas City, Watkins & Gulf in Louisiana, has resigned that position to become Vice-President of the Kansas City, Pittsburgh & Gulf, which is now building to Texarkana, Ark., and extending to the Gulf Coast, a division already built for some miles south of Texarkana.

—President George W. Parker of the Cairo Short Line, has been formally appointed agent for Receiver Bosworth, of the Chicago, Peoria & St. Louis, in pursuance of the agreement for the sale of the latter road to the former company. There will be no changes at present among the officials of the Chicago, Peoria & St. Louis.

—Mr. C. H. Hammett, Second Vice-President and General Manager of the Galveston, La Porte & Houston road, has disposed of his interests in the road and has resigned as an officer of the company. He will remain in railroad service, being interested in a new railroad in South Texas, to promote which he will soon visit New York City.

—Mr. R. R. Hammond has been appointed Division Superintendent of the Kansas City, Fort Scott & Memphis, with headquarters at Springfield, Mo. He has recently been Trainmaster of that road at Thayer, and his promotion to be Division Superintendent follows the appointment of Mr. W. W. Emmert to be General Superintendent of the railroad.

—Mr. E. L. Corthell informs us that his health is sufficiently restored to permit him to again take up his business. Surely a great many engineers and business men will be glad to know this and will congratulate him on the outcome of his plucky and successful fight against a serious malady. He has moved his headquarters from Chicago to No. 71 Broadway, New York City.

—Mr. W. W. Fagan has recently resigned the position of General Superintendent of the Kansas City, Memphis & Birmingham and the Kansas City, Fort Scott & Memphis roads, which he has held since 1887. He has been succeeded as General Superintendent by Mr. J. H. Emmert, who until now has been Division Superintendent of the Kansas City, Fort Scott & Memphis road.

—Mr. William Thornburg, at present General Superintendent of the Columbus, Sandusky & Hocking road, has been appointed General Manager by the newly appointed Receiver. Mr. Thornburg has been connected with this road only a few months, having previously been Superintendent of the Valley Railroad of Ohio before the operation of that line passed under the control of the Baltimore & Ohio.

—Mr. Nicholas Monseratt, of Cleveland, was last week appointed Receiver of the Columbus, Sandusky & Hocking road in place of Mr. J. H. Stewart, a director of the company who had been appointed the previous week. Mr. Monseratt was appointed one of the joint Receivers of the Valley Railroad of Ohio, a Baltimore & Ohio line, in June of last year and he still holds that position. He was formerly, for many years, Vice-President and General Manager of the Cleveland, Akron & Columbus road.

—Mr. W. B. Thomas has resigned the position of General Manager of the Middle Georgia & Atlantic Railroad and leased lines in Georgia, and has been succeeded by Mr. Joseph W. Preston, with headquarters at Eatonton, Ga. Mr. Thomas remains in charge of the operation of the Atlanta & Florida road, which is now a division of the Southern Railway. He has been ap-

pointed Division Superintendent of the Southern, having formerly been General Manager of the Atlanta & Florida.

—Mr. H. W. B. Glover has been appointed Traffic Manager of the Seaboard Air Line System. This office was abolished on the Seaboard Air Line in February of 1894, after the death of Mr. O. V. Smith, who had held it for many years. At that time Mr. Glover, who had been in charge of freight traffic on the road during the illness of Mr. Smith, was appointed General Freight Agent, and he has held that office since that time. Previously he had been Division Freight and Passenger Agent of the Seaboard Air Line at Atlanta for about five years.

—Mr. Hiram A. Blood, formerly President of the Cleveland & Canton Railroad in Ohio, and for many years connected with that company in its financial management and as a director, died at Fitchburg, Mass., where he had long resided, on July 6. He retired from the position of President of the Cleveland, Canton & Southern some months ago, being succeeded by Mr. Henry C. Ranney, a Western director. Recently he had made large investments in electric street railroads and gave most of his time to that class of property. Early in life he was interested in various railroad properties in New England, and at one time was President of the Boston, Clinton & Fitchburg, which afterward became one of the lines of the Old Colony road.

—The officers of the traffic department of the Concord & Montreal, it is announced, will be retained as division officers of the Boston & Maine, that road having taken formal control of the Concord & Montreal under the recent lease which has now been formally approved by stockholders of all the companies interested. Mr. D. C. Prescott, who has been General Superintendent and Traffic Manager of the Concord & Montreal, will remain in charge of the traffic matters of that road as Assistant General Freight Agent of the Boston & Maine, with headquarters at Concord, N. H.; Mr. F. E. Brown, the present General Passenger Agent, becomes Assistant General Passenger and Ticket Agent of the Boston & Maine, continuing at Concord, N. H.; Mr. George W. Storer, who has been Assistant General Passenger Agent of the Concord & Montreal at Boston, will retain that title. The changes in the organization other than the traffic department have not yet been announced.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—A circular officially announcing the appointment of new freight agents has been made public. The following appointments were made: C. H. Morehouse, General Agent Freight Department, Denver; T. M. Orr, General Agent Freight Department, Chicago; J. W. Tedford, General Agent Freight Department, Pittsburgh, Pa.; R. H. Davis, Commercial Agent Freight Department, Milwaukee; J. C. Dietz, Traveling Freight Agent, transferred from Des Moines, Ia., to Minneapolis, Minn. The office of Assistant General Freight Agent in Denver has been discontinued.

Barre.—At the annual meeting of the stockholders of this company, the following directors were elected: A. D. Morse, E. L. Smith, John Trow and F. W. Stanyan, of Barre; and W. A. Stowell, of Montpelier, Vt. The following officers were elected: President, A. D. Morse; Vice-President and Managing Director, W. A. Stowell; Clerk and Treasurer, F. W. Stanyan.

Boston & Maine.—This company, having leased the Concord & Montreal Railroad, the operating divisions will be organized as follows: The Southern Division of the Boston & Maine will extend to Concord, N. H., including all the branches thereof, under the charge of George F. Evans, Superintendent, Boston, and W. G. Bean, Assistant Superintendent, Concord, N. H. The main line and branches north of Concord will be operated as the White Mountain Division, under the charge of George E. Cummings, Superintendent, with office at Woodsville, N. H. The rules and regulations of the Concord & Montreal Railroad will remain in force until otherwise ordered. The following appointments have been made, to take effect from July 1: F. E. Brown, to be Assistant General Passenger and Ticket Agent, with headquarters at Concord, N. H., and will report to D. J. Flanders, General Passenger and Ticket Agent. George W. Storer, to be Assistant General Passenger and Ticket Agent, and will report to the General Passenger and Ticket Agent, D. J. Flanders. D. C. Prescott, to be Assistant General Freight Agent, with headquarters at Concord, N. H., and will report to M. T. Donovan, General Freight Agent.

Chicago, Rock Island & Pacific.—Charles D. Golding has been appointed Traveling Freight Agent, with headquarters in Houston, to succeed J. W. Fallon, resigned. Mr. Golding has been transferred from Utah, where he has been in the service of the company for the past seven years, recently as freight agent, with headquarters at Ogden.

Elkton & Middletown.—The annual meeting of the stockholders was held in Elkton, Md., July 2. The following Directors were elected: John P. Greene, Henry D. Welsh and Samuel Rea, of Philadelphia; Jacob Tome and Samuel C. Rowland, Port Deposit; George S. Wooley and Henry H. Bradley, Chesapeake City, Md. The officers are: President, Jacob Tome, Elkton; Vice-President, Samuel Rea, of Philadelphia; Secretary and Treasurer, F. W. Swartz.

Galveston, Harrisburg & San Antonio.—The annual meeting of the stockholders was held at Houston, Tex., July 2. The old board of directors were re-elected as follows: C. P. Huntington, of New York; J. Kruttschnitt, of Houston; W. G. Van Vleck, of Houston; I. E. Gates, of New York; W. B. Mulvey, of Houston; C. B. Segar, of Houston, and Charles Babbidge, of New York.

Jacksonville Terminal.—W. M. Davidson has been appointed Superintendent, with charge of all property of the company. His headquarters will be at Jacksonville, Fla.

New York Central & Hudson River.—Charles P. Hemenway, who has been Agent at the Ohio Street freight house at Buffalo since March, 1892, has just been appointed Train Master of the Buffalo Division. The office of Assistant Superintendent of this division, until recently held by Clinton L. Rossiter, now President of the Brooklyn Heights Railroad, of Brooklyn, N. Y., will not be filled for the present at least, the duties being assigned to the Train Master.

Northern New York.—The Northern Adirondack has been reorganized under the above name, and the following officers are now in charge: C. B. Hibbard, President; C. E. Arnold, Albany, N. Y., Vice-President; J. H. Hamilton, Superintendent; Geo. H. Watson, General Freight and Passenger Agent and Cashier; Geo. P. Colpas, Auditor. The general offices are at Tupper Lake, N. Y.

Plant System.—A. K. McCown, formerly Superintendent of the Middleborough Belt, is now Assistant Master of Transportation of the Plant System at High Springs, Fla.

Rio Grande & Santa Fe.—Articles of incorporation of the company have been filed in New Mexico by E. O. Wolcott, C. H. Schlacks, A. S. Hughes, J. B. Andrews and C. M. Waterman. The officers are: E. T. Jeffery, President; C. H. Schlacks, Vice-President; J. W. Gilluly, Treasurer; J. B. Andrews, Secretary, and E. R. Murphy, Auditor, who are officers of the Denver & Rio Grande.

Seaboard Air Line.—The following explains the new organization of this company's lines for operation, which was noted in our issue of last week. The road is to be divided into three divisions, known as the first, second and third divisions. The first division will be in charge of T. Whisnant, with title of Superintendent, and headquarters at Portsmouth, Va.; the second division will be in charge of William Moncure, with title of Superintendent, and headquarters at Raleigh, N. C.; the third division will be in charge of V. E. McBee, with title of Superintendent and General Agent; headquarters at Atlanta, Ga., and in his duties as General Agent, Mr. McBee will have charge, under the Traffic Manager, of this company's freight and passenger interests at Atlanta and in territory heretofore covered by W. L. O'Dwyer. The First Division will comprise the railroads between Portsmouth, Va., and Raleigh, N. C., 175.6 miles; Boykins, Va., and Lewiston, N. C., 35 miles; Pendleton, N. C., and Murfreesboro, N. C., 6 miles; Henderson, N. C., and Durham, N. C., 41.4 miles and Franklinton, N. C., and Louisburg, N. C., 10 miles, a total of 268 miles. The Second Division, the roads between Raleigh, N. C., and Hamlet, N. C., 96.6 miles; Moncure, N. C., and Pittboro, N. C., 12 miles; Hamlet, N. C., and Gibson, N. C., 10 miles; Wilmington, N. C., and Rutherfordton, N. C., 267 miles, a total of 385.6 miles. The Third Division will comprise the roads between Monroe, N. C., and Atlanta, Ga., 272.2 miles and Belt Junction, Ga., and Inman Park, Ga., at Atlanta, 5 miles, a total of 277.2 miles.

H. W. B. Glover has been appointed Traffic Manager, with headquarters at Portsmouth, Va.

W. W. Gwathmey, Jr., has been appointed Chief Engineer, with headquarters at Portsmouth, Va.

The offices of Superintendent of Roadway and Superintendent of Transportation have been abolished.

Tallassee & Montgomery.—The incorporators of this new company in Alabama are I. W. Durr, W. Goetter, Sigmund Roman, W. H. Micou, Jr., of Montgomery, A. J. Milstead, F. D. Milstead and W. H. Micou, of Tallahassee, Ala.

RAILROAD CONSTRUCTION.

Arkansas & Northwestern.—F. Fanning, Chief Engineer of this company, has organized several engineering parties to make the locating surveys from Bentonville, which is the county town of the most northwestern county in Arkansas, to a point on the Arkansas and Missouri State line, near Southwest City, Mo., the distance being about 25 miles. The company was incorporated just a year ago to build this line by Joseph Hansen, C. L. Robinson and others, of Bentonville, Ark. It is now stated that the contracts for constructing the line will be given out as soon as this locating survey has been made.

Big Stony.—This railroad is being constructed from a connection with the New River branch of the Norfolk & Western at Big Stony Junction, west of Radford, Va., north through Montgomery County. It will be about 11 miles long, and the grading is now practically ready for the track. It is expected to have the road in operation by Aug. 1 next. It is being built to reach timber and mineral lands. John Sexton is the contractor. The General Manager is J. W. Sweet, of Houghton, Va., and T. A. Wygal is Chief Engineer.

Canadian Roads.—The following bills last week received the assent of the Dominion Parliament and have become law: To incorporate the Langenburg & Southern; to incorporate the St. John River Bridge Co.; to incorporate the Deschenes Bridge Co.; to incorporate the Trail Creek & Columbia; respecting the St. Lawrence & Adirondack; respecting the Canada Southern; respecting the Temiscouata; to incorporate the Ottawa & Aylmer Railway & Bridge Co.; respecting the Alberta Railway & Coal Co.; to amend the act incorporating the Canaca & Michigan Tunnel Co., and to change the name of the company to the Canada & Michigan Bridge & Tunnel Co.; respecting the Ottawa, Annaprior & Parry Sound, and respecting the Manitoba & Southeastern.

Chattahoochee Valley.—Articles of incorporation of this company to build a road from Lanette, Ala., 20 miles above Opelika, to the Langdale cotton mills, on the Chattahoochee River, have been filed with the Secretary of State at Montgomery. The incorporators of the new road are the owners of the new cotton factory recently completed at Lanette, and the road, which will be a standard gage, will be built to connect the two factories. The incorporators are given in another column.

Choctaw, Oklahoma & Gulf.—President Francis I. Gowen, of Philadelphia, has just returned from an inspection of the lines of the company in the Indian Territory, and states that rapid progress is being made on the extension from South McAlistier to Oklahoma City, over 100 miles. He believes that the new line will be ready for operation by October 1.

Duluth, Mississippi River & Northern.—This road is building a line through the town of Hibbing, in Northwest Minnesota, and to large tracts of pine lying north of it, which are to be lumbered the coming year. It began carrying iron ore last week.

Elberton Air Line.—This railroad in northwestern Georgia, one of the operated lines of the Southern Railway, has just been made a standard gage line. It was formerly 3 ft. gage and the change to standard was authorized by the stockholders in May last. The line is about 50 miles long and extends through valuable agricultural districts in Georgia, connecting with the main line of the Southern road about 95 miles northeast of Atlanta.

Elkton & Middletown.—The annual meeting of the stockholders, which was held at Elkton, Md., last week has revived interest in the line, and it is expected that another start will shortly be made on the line south of that town. The Pennsylvania Railroad has considerable interest in the construction of the new line, and Samuel Rea, Assistant to President Roberts, is Vice-President of the new railroad. By a vote of the Maryland Legislature the company would have secured \$58,000 in county bonds if its railroad to Cecilton, 16 miles, had been completed by Aug. 1 of this year. That is now impossible, for only a few miles of the railroad south of Elkton to the Elkton River has been constructed, this work having been done in the summer of 1893. The road has been surveyed through Chesapeake City and Cecilton to Massey's

on the Baltimore & Delaware road, which is a division of the Philadelphia, Wilmington & Baltimore. The line is in opposition to a line called the Elkton & Southern, which is projected to build over practically the same route and is supposed to be supported by the Baltimore & Ohio. The two companies have long been in conflict, and the quarrel between them as to which company was entitled to the county bonds mentioned above was settled at the last session of the Maryland Legislature in favor of the Elkton & Middleton provided, as stated, that the road was completed to Cecilton by Aug. 1. That condition cannot now be complied with, and it remains to be seen whether the bonds will be transferred to the Elkton & Southern or whether this company can secure another extension in time.

Georgia Tennessee.—This company secured a charter in Georgia last week to build a road from the city of Atlanta in a northwesterly direction to a point on the state line in Catoosa County, in the direction of Chattanooga. The incorporators named in the charter are Augustus H. Benning, Thomas Barna, Rufus B. Bullock, James H. Gilbert, Peter G. Grant, D. B. Harris, John S. Panchen, James L. Riley, Roby Robinson and Robert F. Shedden, of Atlanta.

Gulf & Interstate.—The tracklaying on this road through Bolivar Peninsula, from Point Bolivar, opposite Galveston, to Beaumont, Tex., is to be done with a Harris tracklaying machine. The apparatus has already arrived at Beaumont in charge of George F. Hicks, and will immediately begin work on the contract of Jones & Bro., out of that town. As stated last week, the officers have arranged to complete the division between Bolivar Point and Galveston as soon as possible, and contracts have been given out for the portions of the line between these points not already graded.

Hendersonville & Brevard.—The contractors for this road in Western North Carolina, Warren, Jenks & McNeely, report that so far they have completed the tracklaying on the road for 8½ miles beyond Hendersonville, N. C. It was expected that the tracklayers will reach the crossing of the French Broad River early this week and that the track would be laid into the terminus at Brevard, N. C., by Aug. 1, or soon after that date. The road connects with the line of the Southern Railway at Hendersonville, a station some miles south of Asheville, N. C., and from that town extends southwesterly to the terminus at Brevard, in Transylvania County.

International Radial.—The bill incorporating this company has been passed by the Railway Committee at Ottawa. The company proposes to construct a road from Hamilton, Ont., to Galt, Preston and Berlin, with branches to Guelph, St. Mary's and to a point on the shore of Lake Erie.

Jamestown & Lake Erie.—Hon. C. D. Haines, of Kinderhook, N. Y., and Hon. Lafe Pence, who have recently purchased this property, formerly the Chattanooga Lake road, propose to extend the road from Clifton, one mile north of Jamestown, on Lake Champlain, to Falconer, to connect with the Dunkirk, Allegheny Valley & Pittsburgh. Surveyors will begin work at once along the valley of Moon's Brook. It is the intention to have the new line open for traffic in September.

Kalamazoo Switching & Terminal Co.—About a mile of track was laid by the company on Sunday, July 7, through one of the city streets to forestall an injunction by the Lake Shore & Michigan Southern road. The Michigan Central prevented the new line crossing its right of way by a blockade of engines and freight cars.

Kansas City, Pittsburgh & Gulf.—The town of Shreveport, La., and Caddo Parish, in which Shreveport is located, last week voted upon a proposition to issue town and county bonds to the amount of \$325,000 in aid of the southern extension of this road, which is now being built south of Siloam Springs, Ark. There was practically no opposition in the city of Shreveport to vote the bonds to provide these funds and very little in the parish outside of the city. The division of this company for which these bonds were voted is already under construction, about 120 miles of it being under contract. This brings the line to a point in Arkansas, north of Texarkana, where it will connect with the Texarkana & Fort Smith Division already in operation for some distance north of that point and also south of it toward Shreveport. About 70 miles of road remain to be constructed beyond the present terminus near the Sulphur River to reach Shreveport. Work on this line is now going on and the contracts for the balance, and it will probably be given out without delay now that the vote of Shreveport has been secured in favor of issuing bonds.

Lancaster & Hamden.—It is expected to recommence construction work on this railroad in Southern Ohio within a few weeks. Arrangements have been made in the last few months to complete the entire line between Columbus and Wellston, O., during the present season. That portion of the road from Lancaster and Hamden Junction, a station on the Cincinnati & Muskingum Valley west of Lancaster, O., south to a point near South Bloomville in the southern part of Hocking County, is already built, having been graded a few years ago by E. P. Buell & Co., contractors of Ohio. The work now to be undertaken is the extension of this division north from Lancaster & Hamden Junction into Columbus, and south from its present terminus in Hocking County to Wellston, where the Jackson County coalfields will be reached. The line may also be extended at a late date from Wellston to a point on the Ohio River. The object in building the line is to get a direct outlet from the Jackson County coalfields to the north and northwest via the railroads leading north of Columbus. William H. Stevenson, who was formerly President of the Housatonic Railroad in Connecticut, is now in charge of the construction of this railroad, his office being at 56 Pine street, New York City.

Long Island.—A new charter has been granted in Georgia for this company on the application of Henry A. O. Post, Russell Sage, Thomas H. Hubbard, Newman Erb, Henry L. Lamb, E. A. C. Altman and Frank H. Davis. The capital stock is fixed at \$3,000,000. The road was recently sold at foreclosure in February to the bondholders.

Long Lake.—This company was incorporated at Albany, N. Y., July 3, to construct a steam road in the Adirondacks about ten miles in length from Axton south to Long Lake, connecting at Axton with the Raquette River Railroad, organized to build from Axton to Raquette Lake. The capital is \$100,000, and the directors are: C. E. Arnold, of Albany, President of the Raquette River road; A. J. Voyer, W. P. Shaw, M. J. Canady, John Wagner and Clifford D. Gregory, of Albany; E. K. Johnson, of Bath; George I. Humphrey, of Saratoga; and F. S. Wadhams, of New York City. The State Railroad Commission will give a hearing on July 16, on the company's application for permission to construct its road.

Marshall, North & South.—The Texas Attorney General has approved the charter of this railroad, projected from Marshall to Center, in Shelby County, Tex.

North Carolina Roads.—The Railroad Commissioners of North Carolina are now assessing the railroad property of that state. They find that building (up to June 1) was being carried on on only three railroads, the Hendersonville & Brevard, the Aberdeen & West End and the Caldwell & Northern, the latter being constructed from Lenoir to Collettsville. Four miles of the extension of the Aberdeen & West End have been completed. The Commission has been notified that the twenty-two miles of the Henderson & Brevard road will be completed by Aug. 1.

Northern Pacific.—The branch from the Northern Pacific & Montana to the Parrot Silver & Copper Mining Co.'s smelter near Whitehall, Mont., is now under contract. The line will be about four miles in length, diverging from the main line at the town of Whitehall, and terminating at the smelter site. Cook & Weldson of Helena, Montana, have the contracts for building the road. Work has not yet been begun, but will be started at once. The grading will be light, and but one bridge crossing the Jefferson River will be required, which is already on hand.

Ohio River, Knoxville & Tidewater.—On July 3 the city of Knoxville, Tenn., by a light vote donated to this Knoxville Belt Mine & Terminal Company bonds amounting to \$100,000. The same amount was voted by the county in which Knoxville is situated, on July 6, to the Ohio River, Knoxville & Tidewater Railway which is projected to extend from the Jellico coal fields to Port Royal or Charleston, via Knoxville. Stock is taken in exchange for the bonds. These are the projects of Col. Albert Boone.

Rio Grande & Santa Fe.—This company has been organized to operate the Santa Fe Southern road in New Mexico, recently purchased at foreclosure for the Denver & Rio Grande, whose officers are named as directors of the new company. The present line is about 34 miles long, giving the Denver & Rio Grande a connection with the town of Santa Fe from Espanola to the north. It is understood that important extensions of the road will be made by the Denver & Rio Grande.

Sanford, Lillington & Eastern.—The officers of this company expect to be ready to begin the construction work on the road during the present month. The route has not yet been definitely located, but the Chief Engineer, J. D. Bonshall, states that the surveyors will be sent out on this work within a few days. The road will be about 80 miles long altogether and will start from Sanford on the Raleigh & Augusta Division of the Seaboard Air Line in the northern part of Moore County, and extend easterly to Lillington.

Sherman, Shreveport & Southern.—The town of Shreveport, La., and Caddo Parish, in which it is situated, last week voted a tax of \$60,000 for this company in aid of the extension of this line from Jefferson, the present terminus, to Shreveport. The proposition to issue these bonds to this company, and \$385,000 of bonds to the Kansas City, Pittsburgh & Gulf was voted upon on June 29 and was carried with but little opposition. Preliminary surveys for this extension into Sherman were made during the winter and General Manager F. W. Pratt, states that the locating surveys will probably be begun at once so that contracts can be let during the summer and work commenced this season.

Sonoma, Mendocino & Humboldt.—Articles of incorporation of this company have been filed in California for a road to extend through the three counties named.

Southern California.—The company is arranging the preliminaries for the reopening of the Temecula Canon route. This branch line was destroyed by washout about three years ago and owing to the sparse traffic at that time it was temporarily abandoned. Since then the surrounding country has developed enough to now justify reconstruction. The rebuilding of the road will give a direct connection between San Diego and coast points as far north as Los Angeles Junction to San Bernardino.

The company is now constructing a large ocean wharf at the port of Redondo, near Los Angeles, to which any heavy draught Pacific steamer can tie up. The sea trade at this port has so largely increased in the last year that the old wharf was totally inadequate to transact the business offered.

Southern Pacific.—We recently noted the completion of the branch line into the City of Pasadena, in Southern California, this necessitating the construction of about five miles of new line from the main line at Shorb. It is now stated that from this latter station it is contemplated to double track the main line to Los Angeles, thus providing ample facilities for the heavy suburban passenger traffic between the two cities.

The company is also arranging for the extension of the present Long Beach route to Westminster, Garden Grove, Anaheim and Santa Ana, there connecting with the present line. This new construction will require about 25 miles of new road. The construction of the line is demanded by the heavy freight trade of the coast ports.

Other contemplated work is being surveyed in an extension from the main line at Pomona to pass through the town of Chino and thence on to Riverside. Both Riverside and Chino are large freight shipping points, the former being the center of the orange shipping trade, and the latter the site of a large beet sugar industry.

State Line, Stillwater & Southwestern.—This company has been organized at Stillwater, Oklahoma, with the following officers: President, Frank J. Wickoff; Vice-Presidents, H. E. Hand and C. P. Rock; treasurer, H. W. Kiser; Secretary, F. C. Hunt; Superintendent, W. F. Hodges. The company proposes to build a branch from the Atchison road to Stillwater in Oklahoma, and southeast to the Choctaw coal fields.

Tallasee & Montgomery.—This company was incorporated in Alabama last week, with I. W. Durr, of Montgomery, Ala.; A. J. Milstead and N. H. Micou, of Tallasee, as incorporators. The road will be built from Tallasee, near Montgomery, where important cotton mills are located, to Goodwyn Station, on the Western of Alabama, a distance of eight miles. An iron bridge is to be erected near Goodwyn, over the Tallaposa River, and work is to be commenced as soon as the bids are let. A committee of the Tallasee company has concluded the details of an agreement for the operation of the road, when built, by the Western of Alabama.

Terminal Railway of Buffalo.—The application of the incorporators of this company to the Railroad Commissioners of New York for authorization to construct the proposed line of railroad between Depew and Blaisdell, just west of Buffalo, will be heard before the Commissioners at Albany, N. Y., on July 16. At the same time the application of the Depew & Tonawanda and

the Depew & Southwestern Railroad companies for authority to build over practically the same route will also come up before the Commissioners. These latter companies propose to build a line from Depew to Tonawanda, north of Buffalo, and another to a point south west of Buffalo, and it is understood that the Lehigh Valley is interested in the organization of the companies and the construction of the lines as proposed by them. The Terminal Railway Co. of Buffalo has been organized by H. W. Webb, Vice-President of the New York Central, to build a line about 11 miles in length from Depew east of Buffalo to a connection with the Lake South & Michigan Southern southwest of the city, forming practically a belt line which will enable trains to run past Buffalo without making the tedious journey through the city limits.

Valley Terminal.—The preliminary surveys for this line have been made and the contract for building the 38 miles of road to Green Bay, Wis., will probably be let within two weeks. The line is to be built from Neenah, at the north end of Lake Winnebago, to Green Bay, passing through the towns of Appleton, Kimberly, Combined Locks, Kaukauna, Wrightstown and De Pere. The construction of the line for a portion of the way will be expensive. The 20 miles of the north end near Green Bay will be ordinary rail work, but the south end is more broken with bridges and trestles. The average grade is about 26 ft. to the mile. There will be one swing bridge over the Fox River at Appleton and a number of other bridges and trestles. The officers of the company are: John J. MacIntire, President, Niagara Falls, N. Y.; George E. Green, Vice-President, Binghamton, N. Y.; Walter B. Pelton, Secretary, Appleton, Wis.; Joseph Taylor, Treasurer, Detroit, and D. C. Dunlap, Chief Engineer, Chicago.

Wisconsin & Michigan.—It is stated that the company will extend its line from Flathorn Junction to Florence, Wis., a distance of about 25 miles. This extension will reach the principal mines of the Menominee range and will be near enough to the main source of the Menominee River to do considerable lumber business in connection with the car ferry route from Peshigo, Mich., to South Chicago.

GENERAL RAILROAD NEWS.

Chattanooga Union.—Judge Hammond of the United States Court at Chattanooga has filed a decree, confirming the sale of the Chattanooga Union road, which was bid in at Receivers' sale, June 17, for \$110,000, by the Southern Railway. The Southern will utilize the road to better its terminal facilities in Chattanooga.

Chicago, Burlington & Quincy.—The statement of earnings for May shows a small surplus over the proportions of fixed charges for the month, which shows a gain of \$52,430 over 1894. This result was obtained only by a heavy reduction in operating expenses of nearly \$110,000 for the month. For the five months, a deficit of \$244,571 is shown, a loss of \$763,606 over 1894, when there was a surplus of \$519,035 for the year.

The following table gives the details:

Month of May:	1895.	1894.	Inc. or Dec.
Freight.....	\$1,574,292	\$1,600,609	D. \$26,317
Passenger.....	577,140	561,041	I. 16,099
Mail, etc.....	325,769	354,066	D. 28,297
Total earn.....	\$2,477,201	\$2,516,317	D. \$39,116
Exp.....	1,626,499	1,735,797	D. 109,298
Net earn.....	\$850,702	\$780,520	I. \$70,182
Fixed charges.....	815,000	797,248	I. 17,752
Balance.....	\$35,702 def.	\$16,728	I. \$52,430
Since Jan. 1:			
Freight.....	\$7,183,024	\$8,494,376	D. \$1,311,352
Passenger.....	2,688,336	2,736,630	D. 48,294
Mail, etc.....	1,637,948	1,565,636	I. 72,312
Total earn.....	\$11,509,308	\$12,796,602	D. \$1,287,294
Oper. exp.....	7,978,879	8,291,419	D. 312,540
Net earn.....	\$3,530,429	\$1,505,273	D. \$2,025,156
Fixed charges.....	4,075,000	3,986,238	I. 88,762
Deficit.....	\$244,571 sur.	\$519,035	D. \$763,606

Cincinnati, Hamilton & Dayton.—The proposed consolidation of the Cincinnati, Dayton & Ironton, and the Cincinnati, Dayton & Chicago with this company, has been approved by the stockholders of the three companies. Last week, in Dayton, the stockholders of the first two companies voted for consolidation, and the stockholders of this company ratified the articles of consolidation at Cincinnati on July 8 without a dissenting vote. This completes the preliminary voting, and on July 30 there will be a meeting of all the stockholders of all the companies to elect a Board of thirteen Directors.

Cincinnati, New Orleans & Texas Pacific.—The securities of the railroad which were given as collateral for the Cincinnati extension bonds of the East Tennessee, Virginia & Georgia, were sold at Knoxville, Tenn., on July 2, under a decree of the United States Circuit Court. The securities were bought by President Samuel Spencer, of the Southern Railway Company, for \$1,500,000. The sale carries the controlling interest in both the Cincinnati Southern and Alabama Great Southern Railway. President Spencer says the Queen and Crescent lines will be operated separately from the other lines of the Southern Company.

Columbus, Sandusky & Hocking.—The Metropolitan Trust Co., of New York, as trustee of the first mortgage bonds, last week filed a petition in the State Court in Ohio to be made a party to the suit for foreclosure which was begun the week previous by a minority stockholder. This action was taken with the concurrence of President Guerin and other directors who had opposed the first petition for a receiver. It is stated that an amicable plan of reorganization has been agreed upon and will be carried out immediately. In this suit Nicholas Monseratt was appointed Receiver, succeeding J. H. Stewart.

Greenfield & Northern.—The Kansas City, Fort Scott & Memphis road has secured control of this property in Western Missouri, extending from South Greenfield, on that road, southerly to Aurora, Mo., where it connects with the St. Louis & San Francisco. The length of the line is 36 miles. It had a bonded indebtedness of \$387,000, its chief owners being John Scullen and J. A. West, of St. Louis.

Humeston & Shenandoah.—This railroad, operating about 113 miles of line across the southern tier of counties in Iowa between the towns named in the title of the company, last week went into a receiver's hands, E. C. Murphy, General Manager of the road, being appointed Receiver by the United States Court at Keokuk, Ia. The application for a receiver was made by W. J. Ladd and J. T. Terry, trustees of the bonds. The road is operated jointly by the Chicago, Burlington & Quincy and the Wabash.

Hutchinson & Southern.—Receiver Byron Roberts, of Hutchinson, Kan., has made a trip over the new line which is soon to be built by the company, south of Cameron, Kan., toward Guthrie, Okla. It is the intention to begin work during July at Cameron, and perhaps also at Guthrie. The present line is 83 miles in length from Hutchinson south to Cameron.

Kingston & Pembroke.—The bill authorizing the company to reduce its ordinary capital stock from \$5,000,000 to \$2,000,000, and to issue preference bonds, was passed last week by the Railway Committee at Ottawa after several amendments had been made to meet objections raised on behalf of certain creditors of the company.

Lehigh & New England.—A special meeting of the stockholders was held at No. 411 Walnut street, Philadelphia, last week, to take action upon a proposed issue of stock and bonds. The issue of \$1,500,000 of stock and \$1,000,000 of bonds being authorized. This company is the reorganized Pennsylvania. Poughkeepsie & Boston sold under foreclosure and purchased in the interests of the first mortgage bondholders. The funds realized from the new securities authorized will be used in filling in several gaps in the present line of road, giving the company a continuous track from Slaton, Pa., to Campbell Hall, N. Y. The company now uses the tracks of the New York, Lake Erie & Western from Campbell Hall to Pine Island, a distance of 17 miles; the New York, Susquehanna & Western from Swartswood to Hainesburg, 18 miles, and the Lehigh & Lackawanna from Pen Argyl to Bender's, 8 miles. The roadbed of the company will also be put in first-class condition.

Louisville & Nashville.—The earnings for May show a net gain of \$1,771. Gross earnings increased \$51,895 and expenses \$50,124, leaving a net gain as above. The statement for May and 11 months follows:

May:	1895.	1894.	Inc. or Dec.
Gross earn	\$1,533,364	\$1,481,469	I. \$51,895
Oper. exp	1,082,157	1,032,033	I. 50,124
Net earn	\$451,207	\$449,436	I. \$1,771
Since July 1:	1894-95.	1893-94.	
Gross earn	\$17,728,677	\$17,129,528	I. \$599,149
Oper. exp	11,195,519	10,783,569	I. 375,950
Net earn	\$6,533,158	\$6,345,959	D. \$187,199

Manchester & Lawrence.—An extra dividend of \$50 has been announced, the funds coming from settlement arrived at with the Concord & Montreal by which the company has received about \$700,000 in full settlement of all claims against the Concord & Montreal road. The balance of \$300,000 is retained in the Manchester & Lawrence treasury.

Metropolitan West Side.—A special meeting of the stockholders was held July 6 at Chicago, at which it was voted to increase the capital stock of the company \$15,000,000, making the total issue \$30,000,000. It is the intention to make the additional or new stock preferred, and to issue it in place of a like amount of bonds which have been authorized.

New York, Lake Erie & Western.—The receivers of the company report the following earnings for May:

May:	1894	1895.	Inc. or Dec.
Gross earn	\$2,080,487	\$2,276,211	I. \$195,724
Oper. exp	1,461,989	1,591,980	I. 129,991
Balance	\$615,498	\$684,231	I. \$68,733
Rentals	164,227	216,243	I. 52,016
Net earn	\$153,271	\$168,988	I. \$15,717
Loss Aux. Cos.	48,752	65,393	I. 16,641
Net earn. of sys. em.	\$404,519	\$408,593	D. \$4,074
October to May 31:	1894-5.	1893-4.	
Gross earn	\$16,915,112	\$16,376,782	D. \$538,330
Working exp.	12,270,570	12,380,240	D. 109,670
Balance	\$4,644,542	\$4,576,541	D. \$68,001
Rentals	1,444,731	1,583,310	I. 138,579
Net earn	\$3,199,811	\$2,993,231	D. \$206,580
Loss Aux. Cos.	325,574	437,974	I. 112,399
Net earn. of system	\$2,874,237	\$2,555,257	D. \$318,980

The gross earnings include for both years the income from other sources, with the exception of interest on securities, and the working expenses include the deductions from income with the exception of the fixed charges and the State taxes.

North Carolina.—At the 45th annual meeting of the stockholders of this road (now a division of the Southern Railway under a lease), to be held at Greensboro, N. C., to-day, President Overman will recommend that some steps be taken to compel the attendance of the private stockholders (who are largely in the minority) at the meetings, and that the charter exemption from taxation by the state be surrendered, as all the other roads in the state have done. To prevent this surrender the private stockholders have for some time been refusing to attend any of the meetings. Three-fourths, or more of the stock is owned by the State of North Carolina, and the representatives of the state's stock desire to surrender the exemption clause in the charter; but, according to some rule or law which the stockholders' meetings act under, it is necessary that the private stock be represented, to some extent at least, at the meeting which takes action on the question. If the private stockholders all continue to refuse to attend the meetings, some plan will probably be devised to either compel their attendance or act without them.

Northern Pacific.—The receivers report that gross earnings for the eleven months ending May 31 were \$16,160,622, an increase over the earnings for the corresponding period of the previous year of \$670,027. For the same period the operating expenses were reduced \$411,649, giving a total increase in the net earnings for the period mentioned of \$1,081,676. The general manager estimates that the net earnings for June will increase the net earnings to an amount in excess of \$1,300,000. This will make the net earnings for the fiscal year just ended in excess of \$6,000,000. It is stated that the above amount does not include earnings from other sources than operating and that these amounted in 1894 to \$962,000. If a similar amount is realized this year the total income will be approximately \$7,000,000. The general manager also states that the operating expenses do not include taxes, amounting to \$465,000, or rentals amounting to \$1,188,000, a total of \$1,653,000. Deducting this amount, the net earnings are reduced to \$5,347,000. The fixed charges, that is the first mortgage interest and sinking fund requirements, interest on underlying liens and on receivers' certificates, foot up about \$3,500,000, leaving a balance of only \$1,847,000 for all the other obligations of the company, provided the income from other sources is equal to that of the previous year.

Pennsylvania.—It is announced that the company has arranged with Speyer & Co. to sell in London \$1,000,000 3½ per cent. 50 year bonds of the consolidated mortgage. There are \$4,693,300 6 per cent. bonds of this

loan already placed abroad. It is understood that the money is to be used to take up certain mortgages falling due next January, among them being \$1,000,000 West Jersey first mortgage 6 per cent. bonds, and several small loans on branch roads near Pittsburgh. A portion will also be used in betterments.

Savannah & Western.—The Bondholders Committee of this property, who have opposed the terms offered to security holders of the road in the reorganization plan for the Central of Georgia announced by Messrs. Samuel Thomas and Thomas Ryan a few weeks ago, have decided to give up their idea of an independent receivership and separate reorganization of the road and to reorganize the road as a division of the Central of Georgia. Before arriving at this decision the Bondholders' Committee secured certain concessions from Messrs. Thomas & Ryan. It is said that under the revised plan the proposed issue of Savannah & Western four per cent. bonds will be abandoned and the consolidated mortgage bonds of the Central of Georgia increased to \$16,000,000. The bondholders will secure in exchange for their bonds 45 per cent. of the consolidated mortgage bonds, 35 per cent. in first preferred income and 25 per cent. in second preferred income of the reorganized Central of Georgia. This company owns the road from Birmingham, Ala., to Americus, Ga., 221 miles, and 342 additional miles of other line, including the Columbus & Western and the line from near Savannah to Lyons, Ga., which connects with the Savannah, Americus & Montgomery and with that connection forms a through line between Savannah and Montgomery.

Toledo, Ann Arbor & North Michigan.—The several properties constituting the railroad were sold a second time, under a decree of the United States Court, in Toledo, July 2. R. C. Martin, of New York, was the purchaser, representing the first mortgage bondholders.

TRAFFIC.

Traffic Notes.

The quantity of anthracite coal mined for the first half of this year has been over 20½ millions of tons, which is more than a million tons greater than the quantity sent to market in the first half of 1894.

The excursion travel between Philadelphia and Cape May, always very heavy in the summer, especially on Saturdays and Sundays, is estimated to have been 20 per cent. greater for the last two weeks than it was in 1894.

The Pennsylvania Railroad has made a reduction in local fares between Philadelphia and stations on the main line west of there as far as Downingtown, 32 miles. Ten-ride and 100-ride tickets have also been put on sale.

A New Orleans despatch says that the steamship line just established between that city and Colon will be abandoned, the Southern Pacific having reduced freight rates from California to meet the demands of the merchants.

The railroads carrying coal to St. Louis, after spending a whole day in trying to agree upon a division of the traffic, have referred the question to J. W. Faithorn and Horace Tucker as arbitrators. Pending a decision it was agreed that no contracts should be made for less than 72½ cents from the outer group of mines, and 45 cents from the inner group.

The complaint of the fruit shippers of Georgia, entered before the Railroad Commission of that State last week, will be referred by that body to the Interstate Commerce Commission, the grievances being connected with interstate rates to Northern cities. According to the press dispatches, the State Commissioners hold that the rates complained of are exorbitant.

Very large reductions have been made in passenger fares to and from Texas, as briefly noted in our Chicago traffic news in this issue. In addition to what is told there, it appears that the Houston, East & West Texas made a sweeping reduction. This line, running from Houston to Shreveport, and connecting at the latter city with the Queen & Crescent for Cincinnati, reduced the rate on July 4 to the latter city, from Houston, to \$13.70.

The National Educational Association met in Denver on Monday of this week, and the baggage masters report that the 12,000 teachers in attendance have five times as many pieces of baggage as were handled in that city in 1892, when 150,000 Knights Templars were there. The result made it impossible to deliver baggage promptly. The principal result of this was to show how vain a thing a shirt waist is. About 3,000 excursionists spent Monday on the mountains, where the temperature fell from 95 degs. to 40.

The vigorous protests made by the commutation passengers on the Chestnut Hill branch of the Pennsylvania Railroad against the withdrawal of the 60 and 180-trip tickets and the substitution of 100-trip tickets at practically advanced rates resulted in the reissuing of the old tickets at the old rates on July 1. The changes in the passenger rates to suburban points that it was intended to put into effect on certain other lines of the company on June 1, but which were reconsidered, have not been abandoned, but are still under discussion by officers of the company.

A majority of the Missouri State Board of Railroad and Warehouse Commissioners on July 2 decided that demurrage charges of \$1 per car per day, collected by the St. Louis Car Service Association, are just and reasonable. A dissenting opinion was filed by one of the Commissioners. The matter came before the Board on the complaint of the Evans & Howard Fire Brick Company. In rendering the decision the Commissioners note the fact that the St. Louis rate is not in excess of demurrage rates in other large cities.

The United States Circuit Court at Montgomery, Ala., rendered a decision July 3 adverse to the Interstate Commerce Commission in the case of the Board of Trade of Troy, Ala. The decision of the Commission in favor of Troy, on a complaint made several years ago, having been ignored by the railroads, the Commission had brought suit against the Alabama Midland and other roads, charging that the defendants had violated the long and short haul clause of the interstate commerce act in charging higher rates on goods hauled to Troy than to Montgomery although the latter had to pass through Troy. The Court says the application of the act is to be modified by circumstances of competition, etc., and that this case is one in which it should not apply.

The Other Side of the Picture.

That New York merchants have somewhat the best of Chicago shippers to common Southern points is conceded. Whether or not this amounts to a discrimination will be decided by the United States Supreme Court,

in the case of the Wholesale Shippers' Association of Cincinnati against the Louisville & Nashville road, which is now before that tribunal. This case was instituted and carried on by the shippers of Cincinnati, and the Chicago Freight Bureau joined in the case without the unanimous sanction of its members. Louisville, Cincinnati, Baltimore, and other cities nearer the Southern field of trade, and not Chicago, are the cities that are suffering from the high rates of the Southern roads. New York is not fighting for the bulk of the Southern trade, because it knows it cannot compete with shipping centers nearer the field. Neither are Chicago merchants, as a whole, after this traffic, for the same reason that New York is not, because they cannot get it. The Cincinnati people and the Interstate Commerce Commission desired to retain ex-Senator Edmunds to fight the railroads. He asked \$10,000. The Chicago merchants were asked to contribute, but they refused, and the Commission paid the entire amount.

No city in the country is now favored with better freight rates than Chicago. The ten eastbound roads are always open to local shippers at practically the latter's own rates. Rates to the far West are always lower from Chicago than from the cities west of Chicago, and the new classification and rates that will go into effect in Illinois July 1, will be lower than in any other state in the Union. Without attempting to defend any railroad traffic association, it is hardly fair to say that whatever discrimination that exists south of the Ohio River is attributable to the Southern Railway and Steamship Association, for the reason that it does not control all of the Southern railroads; many lines are not members of it. Among these are the Southern, with 4,300 miles of road; the Seaboard Air Line, 1,000 miles; the Norfolk & Western, 1,569 miles, and the Chesapeake & Ohio, 1,365 miles, a total of about 8,000 miles. The through passenger service between Chicago and Southern points seems to be equal to the demands. The reason through sleepers are not run from Chicago to Florida is because there is not sufficient business to warrant it. Four-fifths of the Northern travel to Florida is from New York and New England. Through trains are now run from Chicago to Nashville, Tenn.; to New Orleans, and to Norfolk, Va. —Chicago Inter-Ocean.

Chicago Traffic Matters.

CHICAGO, July 10, 1895.

Eastbound shipments (all rail) last week slightly decreased, while lake traffic was remarkably light. The difference in eastbound shipments as compared with the corresponding week last year when the Debs strike was in full blast was 45,280 tons. Lake shipments included 106,000 bu. wheat, 1,447,878 bu. corn, and 420,038 bu. oats. No marked increase is looked for in grain shipments by lake during the balance of the season. Neither are heavy coal shipments looked for at present.

All the lines both east and west of Chicago are making a great show of virtue just at present, and as a result rates are being pretty fairly maintained. There is a decided undercurrent, however, and it would not surprise many well posted railroad officials to see rates break at any time. The mere fact that no one dares propose the calling together of the Western traffic officials to try to make a new agreement to take the place of the defunct Western Trunk Lines agreement, and the total failure of the passenger men to come to an agreement, even after the general managers had explicitly instructed them to do so, is evidence that the officials are far from agreed among themselves. Evidently they fear that any attempt to make an agreement will result in an outbreak. The general impression seems to be that what will eventually ward off any break, if anything does, is the encouraging outlook for crops in nearly every section of the west, except the southwest. Reports from Nebraska and Kansas are particularly encouraging, and it seems hardly possible that there can fail to be a large crop, especially of corn. With a large movement, the incentive to cut rates will be removed, and then a new agreement can be fixed up that will probably last as long as traffic remains good.

Western lines are greatly relieved at the action taken by the New England lines in refusing to be a party to the attempt of the "Soo" line to demoralize the Christian Endeavor excursion rates to Boston by making longer limits than were agreed to by the other lines. Many of the lines had, however, commenced the sale of tickets with the extended limits, to meet the competition of the "Soo" line, and some trouble may be experienced on this account. The Western and the Central traffic roads are extremely bitter in denouncing the attempt of the "Soo" to gain a point in this way.

Texas passenger rates have been cut nearly in two from Kansas City and St. Louis by all the lines. The initiative was taken by the Missouri, Kansas & Texas, in retaliation for a "homeseeker's" excursion proposed by the Kansas City, Ft. Scott & Memphis, which was, however, declared off before it was run. In addition to this, the Missouri, Kansas & Texas put into effect a reduced rate northbound from Texas points. The Santa Fe thought this was hurting its business and proceeded to put in the same rates southbound.

The Western Freight Association is holding its regular bi-monthly meeting at Lake Minnetonka, Minn., this week. Among the subjects under discussion of more than local importance are: Revision of percentages on Colorado and Utah traffic; rates on packing-house product from Iowa points to the Mississippi River when destined beyond the Indiana-Illinois state line.

The shipments of eastbound freight, not including live stock, from Chicago, by all the lines for the week ending July 6, amounted to 56,946 tons, against 58,971 tons for the preceding week, a decrease of 2,025 tons and against 11,666 tons for the corresponding week last year. The proportions carried by each road were:

Roads.	WEEK TO JULY 6.		WEEK TO JUNE 28.	
	Tons.	p. c.	Tons.	p. c.
Michigan Central	4,491	7.9	4,508	7.6
Wabash	3,667	6.4	3,157	5.8
Lake Shore & Mich. South.	8,705	15.3	8,373	14.2
Pitts., Ft. Wayne & Chicago	7,991	14.0	7,979	13.5
Pitts., Cin., Chi. & St. Louis	5,209	9.2	6,611	11.2
Baltimore & Ohio	3,477	6.1	4,530	7.6
Chicago & Grand Trunk	5,470	9.6	3,022	5.1
New York, Chic. & St. Louis	10,233	18.0	10,419	17.7
Chicago & Erie	5,645	9.9	6,066	10.2
C., C., C. & St. Louis	2,056	3.6	2,313	4.0
Total	56,946	100.0	58,971	100.0

Of the above shipments 1,148 tons were flour, 26,652 tons grain and mill stuff, 11,489 tons cured meats, 7,064 tons dressed beef, 2,320 tons butter, 1,294 tons hides, and 4,682 tons lumber.